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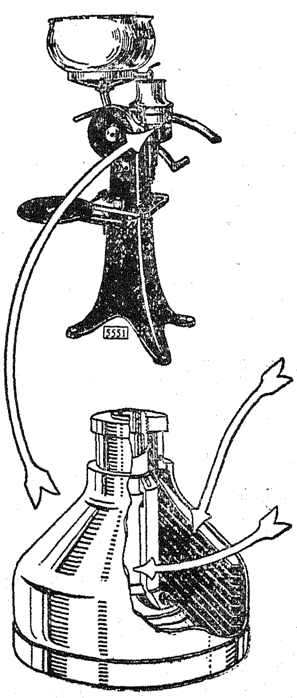

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THE

ALLAHABAD FARMER

VOL. V.] JANUARY, 1931 [No. 1

TO 1931.

Stand off by yourself in your dreaming,
And all of your dreams are vain ;
No grandeur of soul or spirit
Can man by himself attain.
It is willed we shall dwell as brothers ;
As brothers then we must toil ;
We must act with a common purpose
As we work in a common soil.
And each who would see accomplished
The dreams that he is proud to own,
Must strike for the goal with his fellows,
For no man can do it alone.

FROM AN ESTEEMED FRIEND, CLIPPED FROM "PATCHWORK", A MONTHLY PUBLICATION OF THE E. L. PATCH COMPANY, OF BOSTON.

NOTES ON INDIAN CATTLE.

By F. J. Gossip, Livestock Expert to Government of Bengal, Ramna, Dacca, Bengal.

Dairy Cattle

The best milking breeds of Indian cattle are found in the Punjab, Karachi, Gujrat and Madras. They are the Saniwal, Scinde, Tharparkar, Hariana, Gir Gujarati and Ongole. Cows and bulls of these breeds are obtainable but few are milk-recorded. All of these cows cross well with imported dairy bulls and some of the cross breeds give very heavy yields.

The best milch cattle are undoubtedly found in the Punjab, Karachi and Gujrat and cattle from Southern, Central and Eastern India are as a rule poor milkers. So far in India it has been mostly left to the Military Dairy Farms to test cows for their worth as milkers, hence the reason we do not hear much about the Kankrej and Ongole. Where high or dry farming is carried on the breeds of cattle are good but where wet farming is done the cattle are poorer. Good milch cattle are getting scarce in the Punjab, Gujrat and Madras. In the former, due to the canals opening up land for cultivation and here the supply cannot meet the demand. The cause in Gujarat and Madras is due to more land being cultivated and less for the animal to wander over, but the main cause is largely due to bad handling of stock, through religious scruples.

Milch cattle are still available in Karachi and most dealers go there for their supplies now-a-days, but this supply will also decrease when the Sukkar Barge opens, as it did in the Punjab. The Tharparkar come from Scind and are sometimes called the White Scindi. This breed is not so numerous as the red. The Hariana come from Rohtak-Delhi districts and are plentiful, but few are really good milkers, and many now go to the big cities for their milk supply.

Sahiwal

The Sahiwal or Montgomery is a dairy cow and is best suited for dairying. She is a native of the Punjab and is found between Amritsar and Lyallpur and from Lahore to Khanewal. They are of various colours and markings, but the favourite colour is red and light red predominates. They are docile, quiet and easily weaned.

The chief characteristics are colour, as above. Weight 800 to 1200 lbs. Head—large. Forehead—medium. Face—long

and fine with a wide strong muzzle. Ears—medium and drooping. Horns generally short and stumpy. Legs—short and strong. Back—fairly long, dipped in middle, rump sloping. Barrel—in well-fed cows they show a well-sprung deep rib, with large barrel. Tail and switch—long and reaching to the ground. Dewlap—long and pendulous. Udder—in good milkers the udder is well hung (but in old cows gets low and pendulous) with well placed teats of a good size; in good cows milk veins are prominent. These cattle show dairy conformation by a wedge shape. They were intensively bred in the Montgomery district of the Punjab which has a very low rainfall, but since the opening of the canal in 1912, the land in which these cattle grazed is now under cultivation and cotton and wheat is grown instead of cattle breeding, because the former pays better at present than the latter. It is difficult to obtain good Sahiwals outside of Government farms. One sometimes hears of a good milker is such a village but these villages are hard to find and when found the good milker has generally gone. The grantee of Jahangirabad Farm informed me that it would take at least a month to get 50 good milch cows in Montgomery district outside of Government herds.

To try and preserve this very fine breed, the Punjab Government have given grants of land to different people who have to maintain a stated number of animals, and efforts are being made to have all cows milk-recorded; these herds are regularly inspected by the Punjab Civil Veterinary Dept.

Very fine herds of Sahiwals are maintained at the Government Military Dairy Farm, Ferozepore, and Imperial Agricultural Dept., Farm, Pusa. The former herd is undoubtedly the best in India; this herd was started in 1911 by Col. Matson, A.O.D.F. The cows were selected by him from different military dairies for type and milk; no notice was taken of colour, but the cow had to be of the Sahiwal breed and type and also a good milker. Many of the cows in this herd have given over 7,000 lbs. in a lactation, several up to 10,000 lbs. and one 16,000. The average lactation period is 270 days and a good cow will give 4,500 lbs. of milk, but the average may be taken as 3,500 per lactation for cows kept in dairies. Where cows have been carefully bred they give more, but otherwise many give far less than 2,000 lbs. Sahiwals giving less than 2,500 lbs. per lactation should be sold out of the dairy herd; it is often hard to get better milkers.

The average dry period is about 100 days for good cows and 130 for ordinary ones. It has been found that a weaned cow will give a calf every 14 months against 18 months if unweaned.

The males are fit for service from about $1\frac{1}{2}$ to 3 years and females should be mated to calve between 3 years 9 months and 4

years 3 months as it has been found that heifers milk better when they calve about 4 years.

The males of this breed are poor draft animals, but in many places they have crossed well with a lighter breed such as in the C. P. and Behar.

The Pusa herd was started about 1910, and by careful breeding and selection the yields have more than doubled in 15 years.

It will be seen, if this improvement can be made in Pusa so far away from their home, that this breed of cattle will soon acclimatise themselves to the different localities. The great improvements made in the yields of these two herds show how this breed will respond to breeding and recording.

Editor's Note.—This is the first of a series of notes on Dairy Cattle in India. Mr. Gossip is a Livestock expert in no mean sense of the word. Watch for the next number.

HOUSING OF POULTRY

Mrs. A. K. Fawkes.

Secretary United Provinces Poultry Association.

During the past nine years we have had some experience of housing poultry and the conclusions that we have come to may be of some practical help to the poultry keepers in this country.

On the Lucknow farm when first planning it, I considered it advisable to build portable houses, that could be easily shifted to new land in the event of disease or any other cause making it desirable to change the location of the farm. As it turned out this was a wise step, as the heavy floods of 1923 forced us to move the farm to a new locality but the drawbacks to portable houses are their untidy appearance owing to the instability of wood and such like materials in a tropical climate, and their short life, for they are always needing repairs.

The difficulties in planning a suitable house for the U. P. are considerable :

Firstly.—We must have ample air and shade in the hot season.

Secondly.—We need protection from too much cold air in the winter season and from the heavy monsoon in July and August.

Thirdly.—We must guard against ticks, which means that cracks and crevices must be avoided.

These conditions are met by portable houses of wood with

wire netting sides and floors, that can be protected in winter by canvas curtains and can be taken apart and thoroughly sprayed and gone over with a blow lamp if ticks happen to be about, but these constant attentions soon destroy the best of portable houses.

We have therefore now built on the farm a series of poultry houses of another design, which look more workman-like and will stand a good deal of spraying and even a bonfire lit inside them without needing serious repairs.

Each housing unit on the farm is built square in shape and measures inside 10 ft. x 10 ft. This is divided into 2 divisions and takes two breeding pens very comfortably.

If required as a colony house for 1 to 200 birds we add on units 10 ft. square to it, as required.

The floor is well raised (18 inches) off the ground level and the foundation laid with bricks, stones, sand, etc. On the top surface a good cement is laid, both on the floor and for 2 ft. up the walls.

The side and back walls are built of mud bricks which we make on the premises, with the exception of the first two feet up: here we use pukka bricks, so as to make a firm foundation. We also use a row of pukka bricks just at the top of the walls, to take the weight of the roof.

The advantage of the mud bricks is, that they are cooler and cheaper than pukka bricks and if nicely moulded, well laid and well white washed over, have a very neat appearance.

The roof is a $\frac{3}{4}$ span and is made of corrugated iron sheets.

We should prefer asbestos sheets, but the increased cost is a serious consideration. To keep the iron sheets cool in the hot season, we place a grass thatch over the roof or place a layer of thick earth over the metal.

The entire 12 ft. front of the house is of wire netting fitted into angle iron frames, and the supports for the iron roofing are also made of angle iron.

Outside this open front, we extend the roof and the pukka floor some 3 feet in depth, along the entire length of the house. This we enclose with wire netting and in this way secure a wire netted-in verandah, where the birds can sleep in the hot weather. Their perches can be brought from the interior of the house and placed outside. This verandah also gives extra shade and protection from rain and is very easily kept clean.

I attach an estimate for the cost of the materials and you will find that the average cost is Rs. 100 only, for a house 10 ft. x 10 ft. suitable for two breeding pens or for a growing family of 30 to 40 young stock.

The same house makes a good brooder house also, if the hovers are kept in the back of the house and canvas screens fitted into the open wire front.

This type of house is therefore very suitable for all purposes and can be built at a small cost and is very easily kept clean. We have refitted the Lucknow farm with this type of house as our old wooden portable houses depreciated and though only in the experimental stage, they have (this 1928-29 season) been a great success and added to the comfort of the stock and added to the appearance of the farm.

LATER—SEASON 1930.

It has been been found that ticks, unless constantly guarded against, do get into the mud walls of these houses, but otherwise the houses have proved very suitable to the stock.

Tick proof perches *must* be installed, with moveable wooden perches; these latter should be taken out each day and placed in the sun and only put back at roosting time.

Each cup or tin under the tick proof perch *must* be kept filled with water or water and oil.

A further precaution, should ticks be numerous, is to place freshly slaked lime in powdered form to a depth of two or three inches all round the base of the inside walls of the house, entirely enclosing the area in which the birds are perching. By this method any ticks that attempt to crawl down the walls will be smothered in the freshly slaked lime and die.

This method will, if used occasionally, therefore rid the fowl house of all ticks.

Estimated cost of materials for 1 large poultry house measuring 10 ft. x 10 ft. with open verandah and span roof of galvanised iron suitable for 20 to 25 full grown birds including large run 100 ft. x 100 ft. divided at the centre to two alternate runs :—

	Rs.	a.	p.
Approximate cost of house	100	0	0
” ” ” run	191	8	0

ESTIMATE FOR ONE POULTRY HOUSE.

1,500 Pucca bricks	12	0	0
2,000 Kucha bricks	5	0	0
15 c. ft. Lime	4	0	0
Cement ½ bag	1	8	0
Bhoosa	1	0	0
Whiting	1	4	0

LABOUR FOR CONSTRUCTION.

	Rs.	a.	p.
Masons, etc.	20	0	0
Carpenter	5	0	0
Angle Iron	4	4	0
Wire Netting	7	8	0
Tin Sheets	31	8	0
Bolts	0	8	0
Timber	2	0	0
Sand	0	8	0
	96	0	0
Contingencies and unforeseen charges ..	4	0	0
Total ...	100	0	0

Measurement of wire netting run 100 ft. x 100 ft. to enclose above=1000 running ft.

Detailed cost of run to be made of 6 ft. wire, lower portion to be of ½ inch wire and upper 3 ft. to be of 2 inches wire.

	Rs.	a.	p.
Cost of 500 ft. (2 inch mesh) wire or 3½ rolls of 50 yards at Rs. 7 to 9 per roll approx.	25	0	0
Cost of 500 ft. (½ inch) wire or 3½ rolls of 50 yards at Rs. 19 per roll. ...	66	8	0
50 Iron posts at Re. 1-8 each	75	0	0
Gates, hinges and labour etc	25	0	0
Total ...	91	8	0

CEMENT FLOORS.

MASON VAUGH, B.Sc., AG., A.E.

Scarcity of timber, and the white ant, make wooden floors such as are used in Western countries unsuited to India. Many different materials—stone, tile, brick, lime and others—have been used, singly and in various combinations, with indifferent results. In the larger centres, where skilled workmen are available, it is possible to get really nice tile or patent stone floors laid, but the cost is usually quite high.

There is a demand for a smooth, impervious floor surface, which can be made cheaply and by local labour. It should be

smooth, strong enough to resist wear, and should not crack and so let the dreaded white ant through. The most common method of meeting this demand has been to attempt the use of cement in one of several ways. While concrete in various forms has been used to some extent, the most common method has been to put down about four inches of lime concrete, made with lime, sand and broken brick, bed the whole brick on edge on a layer of sand, one inch or more in thickness, sweep the cracks between the brick full of sand, and then plaster top of the brick with a thin coating of cement. This results in a nice surface originally, but one which is usually not durable. Some blow displaces a brick, the cement cracks, ants carry out the sand, and soon the floor is in bad condition.

As the result of a series of experiments, a method which gives good results, at a cost not a great deal higher, has been developed at the Allahabad Agricultural Institute. On the properly settled earth, approximately four inches of broken brick, kankar, gravel, coarse coal clinkers, or any similar material, is laid and rammed hard. This is not really essential, but will help to prevent damp floors. No lime at all should be used in this material. It is not only unnecessary, but seems to be actually objectionable. If available from an old building, a little old plaster may be put on top to close the surface, as fine material is put on a macadam road just before it is finished. Should old plaster not be available, a little fine kankar or coal ashes may be used. Water should be used to help make the material consolidate. First-class bricks are not necessary ; any grade may be used, and it is not essential that the material be broken to any uniform size.

On the prepared sub-base, sand or sifted coal ashes should be spread, just thickly enough to bed evenly the brick to be used for the floor proper. For ordinary bungalow, school or hospital floors, the brick may be laid flat. For workshops, or other large floors subject to heavy traffic, they may be put on edge. They should be laid to a line to get them placed evenly on top, and care should be taken to leave from $\frac{3}{16}$ inch to $\frac{1}{4}$ inch cracks, both on the sides and on the ends.

The brick should then be sprinkled with water as long as it readily absorbs the water put on it. Enough water should be used to thoroughly dampen the sub-base also, but excessive water should be avoided, as it will weaken the cement work. It is desirable to have the brick take a small amount of water out of the cement, but of course it should not be much.

The cracks between the bricks should then be filled with a mortar of one part cement and three parts sand. If it is necessary to sacrifice some strength to cheapness, and if the sand is coarse and clean, one part cement and four parts sand will serve. If the

sand is very fine and very high strength is required, the sand may be reduced to $2\frac{1}{2}$ parts. Under ordinary conditions, 1 to 3 is satisfactory. The mortar should be mixed with rather more water than for bricklaying, and should be either swept into the joints with a heavy broom or raked back and forth with a trowel until the joints are well filled. Inserting a trowel between two bricks and working it back and forth will help. Only the minimum water necessary to get the cracks well filled should be used, as more will tend to wash the cement out of the sand and to weaken the cement not washed out.

Wherever possible, the grouting of the cracks should be carried out in the morning and the surface should be plastered in the afternoon. If the room is large and only a few men are available, the plastering may be done the next day. For ordinary conditions, the surface may be plastered with the same mortar as was used for the grouting. Care should be exercised that all dirt carried on to the grouted floor on the feet of workmen, and all laitance (the white scum which appears on top of cement work when too much water is used) are removed. It is well to sweep off the surface with a heavy, stiff broom just ahead of the plastering. The mortar should be mixed rather dry, and applied as stiff as the masons are able to work it well. Excessive water, again, will weaken the work and prolong the process unduly. The mortar should be spread out, and screeded level with a straight edge. The surface will be improved if it is then flushed with a fairly thin 'soup,' made of plain cement and water well mixed. This should be applied as soon as the cement plaster is levelled out, and not later when trowelling is in progress.

The sprinkling of dry cement at any stage of the work should be prohibited.

The mortar should then be left undisturbed until it gets partly set. Usually when work is started on one side of a room, the first laid will be ready to trowel by the time the last of the plaster is applied. As soon as it can be trowelled without bringing much moisture to the surface, the whole floor should be gone over several times with rectangular plasterer's trowels. The ordinary bricklayer's pointed trowel should be strictly prohibited if a good surface is desired. Excessive trowelling should be avoided. Usually going over the whole surface three to four times will be sufficient. The masons should have small boards or old magazines to squat on while doing this. No attempt should be made to get a 'slick' shiny surface at this time. To do so will involve unnecessary labour, and will almost certainly result in 'crazing'—the formation of fine hair-like cracks—all over the surface, later.

Unless it is exposed to the sun or to hot drying winds, the

floor may then be left just so until the next day. The first thing the next morning the doors may be blocked with a line of brick across the threshold, and the whole floor flooded to a depth of an inch or more. Care should be taken, when the water is poured on, not to disturb the still tender cement. It should be kept moist for at least a week—ten days or two weeks would be better. The easiest way to ensure its not drying out is to keep it flooded. At this stage an excess of water will do no harm.

If for any reason the plaster cannot be applied within 34 hours of grouting the brick, the latter must be very carefully cleaned off, and special care taken to remove any lime, mud, or other foreign substance, which may have got on it. The floor should also be properly moistened, but not made too wet. The plaster on the brick need not be thick. Usually $\frac{3}{8}$ inch to $\frac{1}{2}$ inch will be required to allow for unevenness in the brick, but more is usually unnecessary. The floor will be more easily cleaned, and will look more 'finished,' if the floor plaster is carried up the walls about 8 inches high. The corner should be rounded, and, for the best appearance, the cement baseboard should be about $\frac{3}{8}$ inch thicker than the plaster it meets.

Any time after the fifth day after plastering the floor, it may be drained and polished. Polishing is done by rubbing the surface with rather soft fine-grained sandstones. Even-textured stones, without hard pebbles embedded in them, should be selected. A somewhat coarser-grained stone may be used for the first time over, and followed by a finer. A large amount should not be polished off, as the sand will be too much exposed. A couple of men can easily smooth up a room in one to two days. The polishing may be carried out and the floor again flooded, or the polishing can be deferred until after the curing period. Water should be used liberally under the stones when polishing, and the material ground off should be washed away at intervals.

When floors are constructed in this way, it is unnecessary to make them in small squares. Areas as large as 75 feet by 25 feet have been made in this way without expansion joints, and have remained for two years in one piece, no cracks having yet occurred even at work joints. Several as large as 25 x 40 feet have been down for some years without cracking. If a coloured floor is wanted, colour may be added according to the maker's instructions, and if proper care is taken to unite all parts to the base, the plaster applied may be laid in several colours. No attempt should be made to paint a floor made of cement within a year after it has been laid, unless it is properly treated first. As soon as they have dried out, such floors can be waxed by using any good floor wax, or one made by dissolving bees-wax in turpen-

tine, or by saponifying it with caustic soda or potash. This will improve the surface somewhat.

Note.—Mr. Mason Vaugh, who is Engineer-in-charge at the Allahabad Agricultural Institute, will be glad to help any who requires assistance or advice in building operations.
—EDITOR

BLINDNESS IN INDIA

R. C. Hutchinson, Organising Secretary, All-India Blind Relief Association (The Green Star Society, Town Hall, Bombay.)

India, a fascinating name to the Westerner, which conjures up visions of enchanting colour, glorious sunshine and untold wealth. Behind all that—what? Poverty and abject misery, and for some six millions of India's peoples total darkness and gloomy shadows. It is estimated, and the point cannot be pressed sufficiently enough, that there are one and a half millions of *totally blind* and four and a half millions partially blind people in India. A colossal figure. Surely the fact of four or five per thousand of the 320 millions of India's peoples living in this great shadow of darkness, is worthy of all the preventive effort that can be put forward to combat it. When one considers that so much of this blindness and partial blindness is preventable, it ought to be considered a question of the utmost vital importance.

Of organised effort, and I speak particularly for the millions living in the districts, there has been little. It is hardly necessary to labour the great need for medical facilities in India. In 1926, (according to the Indian Year Book, 1930) there were in existence in British India 4,189 State, public, local fund and private aided civil hospitals and dispensaries. Apart from these hospitals, there are medical mission hospitals, and the number of these in British India and the States in 1929 was 481. As accurate information is not available, the number of hospitals and dispensaries may be put roughly as 1 to about every 22,000 of the population at the present time, throughout the whole of India. But of these, how many are actually organised for opthalmic purposes? Of Government opthalmic hospitals there are the justly famed hospitals of Madras, Bombay, Calcutta and Lahore, and in the Bombay Presidency subsidiary eye departments attached to the hospitals at Poona, Ahmedabad and Karachi. One must not also forget the very good work done by the medical mission hospitals, at Miraj, Shikarpur, Bamdah and Tirupattur, to mention but four. But with the exception of the medical mission hospitals that are in the districts, the great majority of hospitals and charitable dispensaries dealing specifically with eye diseases, are in the towns of India, which

only account for approximately 32 millions of the population of this vast sub-continent. Rural India has an approxmate population of 286 millions. The need therefore for opthalmic effort is in the rural districts and it is unfortunately true that the bulk of the peöples of India are without those medical facilities which would lead them into new pathways of health and happiness. It is also unfortunate but no less true to say, that the Indian peasant, like others who may claim to be more advanced, fails to realise the danger of eye complaints which may, if neglected, lead to blindness. Even where medical facilities are to be had he, as well as his fellow townsmen, will often fail to avail himself of them, and when, for a complaint which he may regard as trivial, he has to travel many miles and attend regularly at a dispensary, it is not a matter for surprise that he remains in his village and suffers the consequence of his neglect.

The Indian people would like medical facilities to be brought almost to their very doors and many an eye is destroyed by the travelling quack who visits the villages and persuades his patients to submit to his unskilled operations. Under these conditions it is perhaps not surprising that we find that most of the blindness which prevails is preventable, but unfortunately is not prevented, and secondly that a great deal of the existing blindness is actually remediable but that no remedy is applied. There are thousands of totally blind persons in India who could obtain some measure of sight if they would submit to a surgical operation. But either they are too ignorant to know this, or they consider the trouble or expense too great; or they are too apathetic to care much, and it is not only that adults are apathetic for themselves but too often parents are apathetic in regard to their unfortunate blind children.

The need then, for preventive measures is apparent, if this great load of blindness is to be lifted from the peoples of India. From 1913 up to the present time, 17 years, continuous and organised effort has been put forward by one man who has this aim in view, **the prevention of blindness among the rural peoples of India.** His eldest child, a daughter, blinded in this country, he has put forward every effort in his power to save the children of others from the same dire calamity. He organised and supervised what are known as 'Blind Relief Associations' in Western India and their work is known far and wide. The system of working is briefly this: *Method A.*—In thickly populated areas, a central hospital with a qualified ophthalmic surgeon is in charge. In the district itself, men known as 'Field workers' after due training at the central hospital, are given charge of several villages. They treat simple cases in the villages, and for each village in their charge they have registers, which they make out. (i) The totally

blind and partially blind. (ii) Cases requiring operation (iii) Eye cases requiring treatment, given and dates. (iv) Inspection of new-born children for the detection of ophthalmia neonatorum. (v) All small-pox cases and measles. All births are notified to the field worker by the head man of the village, and the field worker must see these children for the first ten days after birth, and treat cases found of ophthalmia neonatorum, giving the dates of treatment and the result. Similarly small-pox and measles cases are notified to the field worker. He must immediately go to these cases and begin prophylactic treatment. The loss off an eye to these causes is now happily rare, where this system is working. At the beginning of this year over 1,200 cases of small pox were seen and treated in one district ; out of these one eye was lost, and that because of the late notification of the case. The field workers are supervised by a touring surgeon who inspects and checks the work. Cases that cannot be sent to the central hospital, and require operative treatment are operated on in the village, others are given the money to take them into the central hospital. *Method B.*—In sparsely populated areas, taking Sind for an example, a travelling hospital and staff are continually touring, staying three to six weeks at selected centres. The people are notified of the time of arrival of the hospital and the length of its stay, and thus wide areas that would otherwise never be touched are given every opportunity of scientific help.

The success of both these methods has been phenomenal. Whereas in the first method at one centre, before the Association began its work, only seven operations and about 3,000 cases were treated, out of a population of 900,000 in the district; the last year under report 1929, over 2,000 operations was performed and some 50,000 cases treated. In the second instance where no eye work had been done at all, in 1928, the last year under report, 51,000 cases were treated and operated upon.

From the view-point of propaganda, this personal touch and house-to-house visitation is doing more to make the people understand the necessity for immediate treatment of eye complaints, than all the literature that could be printed and distributed. For India, even now is a country of illiterates. Where before, ignorance, superstition and apathy prevailed, the benefits of scientific treatment, demonstrated in their own homes, is now beginning to bear fruit as the above given figures testify.

But what is this effort in comparison to the millions that at present cannot be reached, because of the lack of funds and workers? A mere drop in the ocean. The All-India Blind Relief Association has been formed with C. G. Henderson, Esq., as its President (the founder of the Blind Relief movement). He has retired from the Indian Civil Service to devote the whole of his

time to the expansion of this work, throughout India. If the funds were to hand we could place a unit in every district in India (there are some three hundred districts) and take from the Government ophthalmic training centres, graduates in ophthalmology, and place them where they are so badly needed. The incentive for field work and research would be given to these young men, and instead of overcrowding their profession in the towns, the rural districts would be given the help they so badly need. The cost is minimal. Rs. 7,000 will keep one travelling unit working for one year. Rs. 15,000 will give to a whole district of say half a million people, a fully equipped staff of ophthalmic surgeons and field workers. Listen to this cry for help....

"Imagine the heartbroken condition of mine, to whose struggle with poverty, is added the horror of sightlessness. Light, the prime work of God, is extinct to me. It is irrecoverably dark for me in the full blaze of noon; I am dead more than half, yet I am not exempted by the privilege of death and burial from the worst of my misery and helplessness." The Indian Empire helped us when we were in travail, may one not ask for some help in return to be given to the millions to whom in the full blaze of noon, it is irrecoverably dark?

R. C. HUTCHINSON.

A TALK TO VILLAGE CATTLE BREEDERS.*

C. H. Parr, Deputy Director of Agriculture, in charge of Cattle Breeding Operations, Muttra, United Provinces.

Speaking generally, the cattle you are breeding and rearing are of poor and inferior type. Usually they are small in size, defective in shape and conformation and are incapable of either becoming or producing good strong, active bullocks such as you require for your cultivation.

Breeding and feeding

The chief causes of this are :—(1) Usually you take no care in regard to breeding. You breed from any sort of bull that may be available at the moment, regardless as to whether it is suitable or not.

(2) You keep many more breeding cattle than you can feed properly, even in the most favourable seasons.

You carry on your cattle breeding business in this way, because there happens to be a demand for low priced bullocks. This demand enables you to obtain a small profit with very little

*Reprinted from Government Bulletin.

capital outlay and little labour, and this you prefer to methods which involve greater expense, more labour and more risk.

Ask for Veterinary assistance whenever disease appears.

It is true that your cattle are liable to disease, and that you lose many and that your losses would be greater if the cattle were individually of higher value. Loss from disease is now largely preventable. Ask for veterinary assistance for protective inoculation and for treatment whenever disease appears. The Veterinary Department can give you very great assistance and save you from tremendous loss if you will ask for and make use of the assistance of that Department.

There is a good demand for good bullocks. It will increase.

You now breed and raise inferior cattle and are satisfied with a few rupees profit. If you were to keep only cattle of the very best type, and in such numbers as you could feed and attend to them properly, your profits would increase. Though the demand for very cheep bullocks is considerable, there is a very good demand for good first-class and higher price bullocks. This demand is increasing and as time goes on it will continue to increase. Cattle Breeders in the United Provinces allow every year lakhs of rupees to go to the Punjab cattle breeders in payment of bullocks of Hariana breed because they are not obtainable in the United Provinces. Why are they not obtainable? It is not because they cannot be bred and raised in these provinces. Equally good bullocks can be raised in over a dozen districts in the western corner of the United Provinces, but you do not take the care and the trouble to breed and raise them as the village breeders are doing in the Punjab.

Year after year you persist in maintaining a lot of weak and weedy cows. These you allow to mate with any sort of bull. You therefore produce no good cattle to offer for sale, and cannot wonder that buyers of good bullocks are going to the Punjab for their requirements.

Cows.

In most villages there are one or two good cows. Make these your standard. Try to procure a few like them. If you cannot afford to buy cows of similar type buy some calves, the progeny of such cows, and as these grow older dispose of your old and inferior stock.

Government stud bulls.

Apply to the Deputy Director of Agriculture, in charge of Cattle Breeding, Muttra, for a stud bull on loan.* All you have to pay is the cost of delivery from Muttra. If you co-operate with other zamindars of other villages and take a truck load of 8 bulls at a time the cost of delivery per bull will amount to very little.

*This does not apply to districts Muttra and Etawah where a high charge is made.

When you get a Government Stud Bull and he has begun to breed, remove all other nondescript bulls from the village herds. If one Government Stud Bull is insufficient ask for two. If you do not care to remove the nondescript bulls which have been let loose from time to time, apply to the Deputy Director, Cattle Breeding, Muttra, and he will arrange this to be done for you. See that all your bull calves are castrated before they reach breeding age and that only the selected stud bulls are allowed to breed. See that your neighbours have their young male stock castrated early too.

Dedicated bulls.

If a member of your village wants to dedicate a bull as a token of respect to a dead relative, insist that the bull is obtained from a Government Cattle Farm. The Deputy Director, Cattle Breeding will supply one immediately on receipt of the way expenses.

There are Government stud bulls in your district. Enquire about them.

Write to the Deputy Director, Cattle Breeding, for instruction and advice in regard to the breeding and feeding of your cattle. Enquire from your neghbours who have already followed the Agricultural Department's advice. Enquire whether they are using a Government Stud Bull. Ask to see the bull, and its progeny, and find out whether a better price is being obtained for its progeny than for the progeny of the other bulls that were in use before the Government bull was received.

Grazing is valuable; do not waste it on worthless cattle.

Remember your grazing areas are limited, that they give you fodder and grazing for only a few months of the year and provide your stock with only a little fodder during these months. Do not waste such valuable grazing on old and worthless cattle. Do not keep cows which do not breed regularly. Keep only the best and these in such numbers as you can feed properly during the months of scarcity.

Fodder crops cost little but may save you much.

Do not trust entirely to your grazing area for your fodder supply. Grow a small area of fodder crop such as Juar, Guar, etc., etc., under irrigation in May and June sufficient to maintain your cattle throughout the year. This costs very little and protects your cattle against fodder shortage.

Silage. Find out all you can about this and learn to make it and use it.

Learn how to make your fodder crops into silage. The Deputy Director, Cattle Breeding, Muttra will tell you how to do this if you apply to him. At the Government Cattle Farms the cattle are maintained on silage practically throughout the year. Visit the Farms and see it for yourself. It will pay you to study and adopt this practice.

Rules regarding Government stud bulls.

You have been told how to obtain a Government Stud Bull on loan. If you have not one already, apply for one immediately. Although the bull will be young when you receive him he will grow into a better bull and give you better young stock, than the bull you are now using. If you so desire you can go to the Government Cattle Farms and select the bull you require yourself.

Ask the Deputy Director, Cattle Breeding, for a copy of the rules regarding the supply on loan of Government Stud Bulls. You will see that the rules are not very exacting. Study the rules and follow the instructions regarding the maintenance of stud bulls when you have received one. Over a thousand stud bulls are now located in over a thousand different villages throughout the United Provinces in accordance with these rules. If the village breeders of the above thousand villages have found the scheme of some use and value you will probably find it of value in yours and of special benefit to you yourself.

EN ROUTE TO INDIA

W. B. Hayes, M. Sc.

There is much about Honolulu to remind one of India. The weather, while we were there, was strikingly like that in Allahadad during a break in the monsoon, but we were assured that this was unusual. The chattering of the mynahs, and the gorgeous flowering shrubs and trees, and the brilliant crotons were all familiar. The gul mohar (Poinciana regia) is very common, but no more spectacular than in India. On the other hand, although it hurts a Hindustani to admit it, the hibiscus both for variety and beauty is beyond anything found in India. Continued hybridization has resulted in a myriad of striking forms. It is said that there are five thousand varieties now grown in the islands.

Other excellent shade and ornamental trees were not familiar to us. Of these the monkeypod tree, with its graceful spread and pink blossoms is perhaps the one we most coveted. Whether they would stand the more severe climate of North India is a question for which we failed to find an answer.

It is encouraging to note that of the wealth of beautiful vegetation on the islands, practically everything has been introduced during the comparatively short period during which they have been inhabited. Is it not probable that plants of great agricultural value, as well as of real beauty, could be added to the Indian landscape by systematic introduction from other parts

of the world? While much of this has already been done, more remains for the future.

Care needs to be used in this matter, however, as the danger involved is also illustrated in the Hawaiian Islands. The prickly pear was introduced as a possible fruit and fodder, and the lantana as an ornamental, and both have become serious pests. The mynah, introduced to fight insect pests, has nearly exterminated the other birds, while the mongoose, which was brought in to kill the rats in the cane fields, has multiplied and become of itself a considerable pest.

The agriculture has less in common with that of India, although the two outstanding crops, sugar cane and pineapples, are also grown there. Of these, cane is easily the more important. The methods of production are those of large plantations, and naturally differ widely from those used by the Indian villager. We visited one plantatien of 8,000 acres. No rotation of crops is used, sugar following sugar year after year. Ratooning is almost universal, fields being replanted on the average about every five years. A crop is harvested every eighteen months. Just before harvesting, each section of the field is burned over, which greatly reduces the labor, as well as checking insects and diseases. After the cane is cut, temporary tracks are laid, and the cane is loaded into cars, which are drawn by mules to the permanent line, where trains are made up and a small engine hauls them into the mill, where the cane is immediately crushed and boiled down to a light brown sugar. On very few of the plantations is this sugar further refined; in most cases it is shipped to refineries in San Francisco. Strangely enough, most of the sugar used in the pineapple canneries comes from Cuba.

The pineapple industry is also highly commercialized. There are several canneries, the most important being that of the Hawaiian Pineapple Company. This one company has about 38,000 acres in pineapple, all of which is canned in the tremendous cannery in the city of Honolulu. Modern machinery and equipment characterize the plant. Because of its shape and nature, one would expect a large amount of hand work in canning this fruit, but actually there is very little. ingenious machines removes the skin and core, and send to the canning tables cylinders of the juicy pulp of uniform size, and needing very little hand trimming. From that stage on, the process is much like that in other types of cannery.

There is comparatively little other agriculture in the territory, except for large herds of beef cattle on some of the islands which are not suited to the culture of either sugar or pineapples. A small amount of rice is grown, and there are market gardens

and dairies near Honolulu. Novertheless, fruit, vegetables, butter and eggs are imported from the mainland.

Of the fruits grown on the island, the papaya and mango appear to be of considerable importance. Uufortunately we were too late in the season to be able to test the mangoes, but the papayas were of very good quality. However, here as elsewhere, it seems almost impossible to produce strains of uniformly good papayas. Breadfruit are quite common in private gardens and seem to be greatly appreciated by those who have learned how to prepare them properly. The jackfruit, a close relative, is rare. In striking contrast with the pineapples and sugarcane, none of these fruits seem to be grown on any large scale.

There seems to be little prospect of any marked change in the agriculture of the islands. The pineapple concerns plan a gradual increase in acreage, as the popularity of this excellent canned fruit increases. Although there has been little profit in sugar in recent years, there seems to be no thought of reducing the acreage. Asked regarding the outlook for the industry, one man concerned in it replied that conditions would improve, as they could not possibly get any worse. This seems to indicate the common feeling. It is held that prices go in cycles, and that it is time for the market to improve. Even now, the more efficient plantations are profitable. As long as pineapples and sugar maintain their present position, there is little chance for development on other lines.

BREEDING FOR SEX

Much interest was created all over the world by an article on this subject which was published in Thornton's quarterly journal of July, 192.. "Among the numerous letters that we have received the following is of such extraordinary interest that we have decided to print it We have referred it to the writer of the original article and he states that he is convinced that the claims made by Mrs. East are fully justified. ..F. T. & Co."

HALCOURT P. O., ALBERTA, CANADA.
(Grand Prairie District).
April 14th, 1930.

JOHN THORNTON & Co.,

Livestock Auctioneers, London, Eng.

DEAR SIRS,

My attention has recently been called to an article written by you, and republished in the "Canadian Ayrshire Review" on the control of sex. As I claim this as my own special discovery, I hasten to write you concerning it. The facts set forth in the first part of your article are almost identical with what I have been trying to bring before the public for the past nineteen years. It is indeed a pity that one should be led to expect to be ridiculed, for such has often been the case with my own work, especially that experiment with the eggs. I have repeatedly tried to get someone to test it out, and as often as I have, been met by this remark, that if it was so simple as that, why had it not been discovered before ?

This theory of the alternation of sex ova in the female is a very old one—the Greeks, Romans, Egyptians, even earlier races, believed in and perhaps practised it (see Job 3 : 3.) and it as continually cropped up ever since, not continuously but now and again, so no one can really claim priority to the bare fact of "alternation." In fact, I can scarcely speak or write to any intelligent person regarding it, without being reminded that they heard it years ago.

But "truth may be put off ; it cannot be put down," and this seems to me to be one of the greatest proofs that it is true, though I have been told that "it has been put to the test too many times and has always failed." We will look into this.

There is one point where all have fallen down in this theory, and you have made the same mistake. Not having studied the subject scientifically that is cytologically and genetically—you naturally conclude that (because nature has given us two organs of generation and we find that beyond any question in our own minds that the sexes alternate) the action of the ovaries alternate. And you even go so far as to quote someone who has stated positively which sex is given off from the right ovary, and which from the left. Now we are given two of these important organs for the same reason that we are given two eyes, or two ears, to double our chances against accident, and if one were diseased or destroyed not a bit of difference would be apparent in the sexual life of the individual. So you see, all the experiments that have been conducted to prove this alternation theory have been useless, and indeed have helped to destroy faith in it.

The truth is that both ovaries are active at one and the same time, the only difference being that one deposits an ovum before

" zenith " of the " heat period ", the other after, thus doubling the chance of impregnation taking place. Both these ova are of the same sex. There is no such thing in nature as an ovary producing ova of one sex alone that may be removed or destroyed, thus giving " dominance " to the other. Nature produces the sexes in equal numbers, normally, and she will not allow her place to be thwarted in this readily. She has hidden her secret well.

You say that the only error would be if the heat period would go unnoticed. This is impossible in my system or method. You have only to calculate the number of days between the birthday of the last calf, and the prospective breeding date, divide this by 21, and the quotient, if even, indicates that the same sex will be conceived, and if odd, the other sex. Nothing can be done to " control" the sex of the first one, but this establishes the mother's " sex period". After that there is no reason for not keeping track of these, as every alternate one is of the same sex throughout all her sex activity, and this absolute preciseness goes on during the gestation period as well, though in a passive form. You may count from conception dates or birthdays, using the same rule, for the reason that a male is always born on what would normally have been the mother's "male period," and likewise, a female is always born on what would have been a mother's female period."

Scientists have become so accustomed to say "it is evidently a matter of chance," that it is hard to believe on the face of it that nature can be so dependable and inexorable as this. Human record will demonstrate it as well as any, and any one can verify this law in a few minutes. I am prepared to answer any objections scientists have regarding this law, as it looks like a denial of all the work they have been doing in the laboratory, and with Mendelism for the past thirty years or so. But it is not really so. The views of the practical, "physical" scientist, can be harmonised with that of the geneticist, but to go into it here would only help to confuse what I wish to present as a clean-cut, simple and practical natural law.

The following record was furnished by " The Holstein-Friesian Association of America," Chicago, Ill. This is a record where all are males.

Breeding Date.	*Birth Dates*	*Sex of Calf.*	
(Pasture bred)	April 13, 1921	Male	10
Nov. 9, 19-1	Aug. 15, 1922	"	6
Dec. 25, 1922	Oct. 3, 1923	"	10
May 12, 1924	Feb. 11, 1925	"	6
June 24, 1925	Mar. 21, 1926	"	4
June 19, 1926	Mar. 22, 1927	"	2
April 24, 1927	Jan. 25, 1928	"	

In this record, using the "sex control" method we have an even number of periods between each birthday and the next breeding date, viz.:—10, 6, 10, 6, 4, 2, respectively. In the last one only is there any doubt as this figures out 1 and 11 remainder. But by the "check-up" method, we calculate the periods between the two breeding dates, and also the two birthdays, and we find in each case there was an even number of periods, so there must have been two. In the practical work there is seldom any question of this kind, but on paper, very careful and accurate work must be done.

In the next record all are females. This was sent to me by the Illinois College of Agriculture, Urbana :—

Guernsey No. 300.

Breeding Date.	*Birthday of Calf.*	*Sex of Calf.*	
Mar. 17, 1922	Dec. 25, 1922	Female	6
Apr. 28, 1923	Feb. 24, 1924	„	4
May 31, 1924	Dec. 2, 1924	Abortion	
		Female	4
Feb. 23, 1925	July 26, 1925	„	4
Nov. 1, 1925	Aug. 11, 1926	„	24
Dec. 26, 1927	Sept. 30, 1928	„	4
Dec. 28, 1928	Oct. 10, 1929	„	

Also here we have an even number of periods of 21 days between the birthday and the next breeding date, being respectively 6, 4, 4, 4, 24, 4.

The following record is from the same source as the females one, and is interesting in contrast to the above two records.

Guernsey No. 262.

Breeding Date.	*Birth Date.*	*Sex of Calf.*	
Mar. 29, 1919	Dec. 28, 1919	Male	23
Apr. 22, 1921	Feb. 5, 1929	Famele	5
May 22, 1922	Mar. 2, 1923	Male	5
May 28, 1923	Feb. 29, 1924	Femal	3
May 14, 1924	Feb. 23, 1925	Male	11
Oct. 16, 1925	July 24, 1926	Female	15
June 18, 1927	Apr. 2, 1928	Male	3
June 5, 1928	Mar. 19, 1929	Female	

(Sd.) L. M. East, (Mrs.),

Halcourt, P. O.,

Alberta, Canada.

A RE-VALUATION OF PHYSICAL CULTURE

S. Muzumdar.

Editor, "Physical Fitness."

I feel I do not need to expatiate much upon the glory of physical culture and the inestimable benefit it affords to humanity. Life is continual movement, it is not stationary. You have either to improve or deteriorate physically as you advance in age; to maintain a static condition of the body is unnatural. Improvement is ensured by physical culture and a stage of superb bodily strength and dynamic energy can be reached, while on the other hand, the absence of movement paves the way to deterioration and decay. Health, as is popularly believed, is not the absence of disease but it is that condition of the body which expresses buoyant vitality and steady growth.

Besides helping the body to grow and to keep it in a condition of health, physical culture has other values. Judged on broader issues, it is a process which benefits society at large. If we are to recognise the physical basis of life, bodily health must stand as the foundation of all human endeavours. It tends to raise the economic value of individuals and thus it has a direct effect on the health of any organised society to which those individuals belong. It is bound to secure the happiness of the individual as well as of society. I take physical culture as a great process of social reform, because it prevents the spread of a number of social evils such as alcoholism, venereal diseases and various moral sins which human society is heir to. Let me quote the summing up of the findings of the Grazioli Interministerial Commission of Italy:—

"The Commission confirms the great educational and social importance of physical culture, which leads to the physical improvement of the race, strengthens the individual and fortifies him against disease, popularises healthy and pleasant pastimes which divert thoughts from various pleasures and, indirectly but effectively, combat alcoholism, venereal disease and other ills, and finally tends to create virility of character."

Any process which is apt to reconstruct society on such a broad basis cannot be regarded as valueless Till yesterday organised Governments of the World failed to appreciate the uplifting values of physical culture. Whatever endeavours were then recorded stood to the credit of individuals who foresaw its value and incidentally inspired youths of all lands to band themselves under the banner of exuberant manhood. The signs of the times have now changed and Governments are awakening to the fact that **the physical basis of life has to be recognised to combat ill-health, disease, death and national deterioration.** It is almost a

natural law for habits to persist in any settled society, but those habits even are now undergoing a radical change everywhere in the world for the betterment of the human race. I honestly believe that individuals and races are gradually understanding each other better for the points of contact brought about by athletic pastimes and life as a whole is endowed with a broader outlook on account of the shiny background of health which makes men optimistic and generous. Like other things physical culture has also its ethical value. Judged on these lines physical culture adds to any nation.

Even if we consider such an outlook on life that human purpose is gradually unfolding itself towards the attainment of the highest form of spiritual advancement, we cannot ignore the physical basis of life. According to that savant, Edward Carpenter, it is human destiny to always advance from the physical stage of life to the emotional and from the emotional towards the spiritual goal. Even such a high ideal denotes that health is a vital element, that is why Hindu lore ordains that the maintenance of physical health is the first form of religious practice, and Christian scriptures accept the human body as the symbol of the Temple of God. In some, radiant health stands as the fundamental basis of human existence, no matter whether that existence is devoted to utterly materialistic pursuits or to highly spiritual ideals.

Old age has already paid up its dues to life. We are therefore concerned only with children and youths who determine social and national growth and who are the principal factors in the reconstruction of society. So far every country has most ignominiously wasted human material and the time has now come to take stock of and improve the condition of national man-power. In such a process physical culture and athletics are going to take a very large share and they are bound to be recognised as better processes than what so far have been adopted for race culture.

Let us for a moment take measure of the cant which modern civilisation has taught us. Lower animals, condemned prisoners and c nvicts are fortified against suffering, and generally are taken greater care of. In a war area where death lurks in the air men are kept inordinately fit to carry on the game of death while honest and toiling humanity writhes in eternal pain battling against suffering and various scourges which are daily finding their victims among us.

It will be foolish to prescribe physical culture as the panacea for all evils. None the less it is true that physical culture in some measure will ensure us against various ills but other measures are also necessary. Mental culture and intellectual uplift are as important as physical improv ment and I put life on a founda-

tion of both physical and mental health. Balance between them has got to be found, because the one bereft of the other will surely fail to build up that human entity which modern civilisation so constantly demands. There is an erroneous idea that culture of the body retards mental growth, and athletics are generally held in great dread by our parents because they think that athletics will incapacitate their followers as successful breadwinners and make them so dull as to render them incapable of being at the head of a family. This idea is partly true and it emanated from the examples of those who specialised in athletics at the sacrifice of mental culture. Our aim is, however, radically different and we have enunciated it in clear terms that physical and mental culture should advance hand in hand and a balance between them has to be maintained to make us extremely fit as a member of the family and as a citizen.

Scientifically, however, physical culture has its effect on the nervous system and the brain, and it is bound to develop certain psychological faculties which are very human. Ordinarily such an effect is liable to remove men far away from animals, but if one is bent upon following the gross and merging into a non-intellectual animal life, we surely cannot blame a process which possesses proved qualities of physical and mental development. It is not impossible to call upon instances to strengthen our argument that even when following the highest form of athletics it is possible to acquire a good deal of mental education. Frank Gotch, the late Champion Wrestler of the World, was a qualified mechanical engineer, so was Georges Hackenchsmidt, than whom a better-built stronger man has not yet been born. Dr. Roller, the celebrated wrestler and training partner of Hackenchsmidt, was a Bachelor of Science and a Doctor of Medicine. I know a few outstanding Indian strongmen who are university graduates, one of them besides being a weight-lifting champion secured first positions in his B. A. and M. A. examinations. Dr. Chit Tun, the best of our Indian weight-lifters, is a B. Sc., M. B. of the Calcutta University. Physical culture is endowed with the virtues of adding to physical and mental advancement; its all-round effect cannot at all be denied.

In the absence of capable physical directors, children should depend upon parents for guidance in physical education. For youths and youngmen physical culture should become the major part of their existence. The value of Play-life is inestimable and whatever teaching we are going to impart, our children should come through the medium of Play-life if we are ever going to make sure of the fullest expression of physical and mental capabilities in them. Play is an accepted medium of teaching with pioneers of child education. Why shouldn't we adopt it as the basis of human life in general?

TNE PRINCIPAL'S PAGE.

May I wish all readers a happy and prosperous New Year? May the year 1931 see more accomplished for the welfare of India than any year of the past.

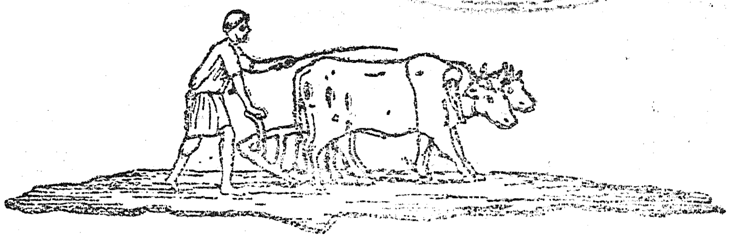
The Christmas mail has brought in many cards from present and former students—revealing a loving and living interest in the Institute, with rejoicing at its progress. Many of these men tell of responsible work being done in the consciousness that they are making a contribution to the well-being of India. There is evidence of a Spirit of Service for India that is encouraging. So I give all former students my hearty congratulations, and ask for their further unselfish work for India.

The year 1931 is bound to bring momentous changes in India. The Round Table Conference is accomplishing much. There is an increase in sympathetic understanding, a desire on the part of all to meet India's wishes to keep her own house. It is impossible to think that men can meet in such an atmosphere and fail to accomplish good. Therefore I look to the coming year with renewed hope and joy, with faith to believe that God will guide India into the paths of honorable peace, that India will make her place among the brotherhood of Nations and will take her mighty contribution to world progress and international goodwill.

The Agricultural Institute expects through her sons to have a humble but essential part in making the India that is to be, the India that fulfills the highest vision and aspiration of her noblest sons. The Institute shows her faith in India by extending her efforts for increased service to the limit of her resources. Next July, God willing, a degree class will be opened by the Allahabad University working with the Agricultural Institute. Deeply conscious of her shortcomings, and her weakness, she offers her best to India knowing that her Sacrifice will be accepted.

The present with its low prices, for all that the farmer grows, may not seem to be the most fitting time to urge more Indian youths to study Agriculture. Yet, to the properly trained man it offers a better chance of employment than any other line. If the trained man cannot work for some-one, he can rent land and with very little capital be sure of a decent living. Again the present low prices will not continue. The cause of low prices is chiefly phsycological; men have lost faith. Faith will return. Men get hungry and desire food, they need clothing and housing. They will seek to satisfy their wants, and so I say the present depression is only temporary. The man who begins his training now will be ready to take advantage of the improving conditions in Agriculture. In faith, in God and man, the Institute offers its best to Indian youth to prepare them to serve India where the need is great.

SAM HIGGINBOTTOM.



EDITORIAL COMMENT.

"Flower in the cranied wall,
I pluck you out of the crannies,
I hold you here, root and all, in my hand,
Little flower—but if I could understand,
What you are, root and all, and all in all,
I should know what God and man is."

—TENNYSON

* * * * *

Appreciation.

At this the beginning of another year, the Editor wishes to thank those who have so splendidly supported the work of The Agricultural Institute with their personal interest, advice, and special favors. Especially, the Editor appreciates the large increase in subscribers to "The Allahabad Farmer". Every mail during the last two months has added to the list of our valued subscribers.

* * * * *

Agricultural Advertising.

We are also pleased to acknowledge a hundred and fifty percent increase in our advertising with this number. To date we believe, **The Allahabad Farmer is the leading non-Government Agricultural Advertising Medium in India.** You can further support us by extending your patronage to our advertisers.

* * * * *

Prospects.

Do you know of anyone who you think would be interested to secure a copy of "The Allahabad Farmer?" or anyone who you think would like to use our columns for advertising purposes?

Kindly drop me a postcard with their names and addresses.

Greetings.

The Staff of The Agricultural Institute, Allahabad and the Editor of "The Allahabad Farmer" extend warm greetings and best wishes for your happiness, progress, and prosperity in 1931.

* * * * *

Purposes of the Allahabad Farmer.

1. To Promote discussion of the problems of rural life in India.

2. To further the efforts of persons and agencies engaged in the field of rural work.

3. To disseminate information calculated to promote a better understanding of Agricultural practice.

4. To aid in Rural Improvement.

* * * * *

The Marks of an Educated man.

He keeps his mind open on every question until the evidence is all in.

He listens to the man who knows.
He never laughs at new ideas.
He cross-examines his day-dreams.
He knows his strong point and plays it.
He knows the value of good habits and how to form them.
He knows when not to think and when to call in the expert to think for him.
You can't sell him magic.
He lives the forward-looking, outward-looking life.
He cultivates a love of the beautiful.

—THE AMERICAN MAGAZINE.

* * * * *

Boys' and Girls' Clubs.

The pledge taken by 4-H. Club members, in the U. S. A., is one which aids them in their travels along the road to achievement, better citizenship, and finer farm homes. It contains valuable suggestions for young and old :

"I pledge :
My Head to clearer thinking,
My Heart to greater loyalty,
My Health to better living, and
My Hands to larger service,
for my club, my community, and my country.

More power to 4-H. Clubs, to parents, and all influences for good in the development of the country's best crop—its boys and girls—the hope of the world. Why can't India duplicate?

Prospects for Indian Dairy Diplomates.

Our dairy graduates have in the first instance sought Government posts with the Agricultural Departments or Military Dairy Farms in India. Students and others seem to regard Government service as the most worth-while, in that it offers more security against the whims of fortune. The early dairy graduates from the two leading Dairy Schools, The Agricultural Institute, Allahabad, and The Imperial Institute of Animal Husbandry and Dairying, Bangalore, were appointed as Supervisors and Managers of Dairy Farms. Those entering the service nowadays begin as apprentices, cattle inspectors and the like, unless favored by special connections with official circles.

We are glad to note that the commercial aspects of the Dairy Industry are now appealing to a large number of our graduating students. We expect each year that a number will operate their own farms, and open their own dairies. Good reports are coming from those who have ventured into the field.

As milk ordinances in the large cities come into force, men trained as milk inspectors will be required. As the idea of co-operation spreads, dairy diplomates will be needed to manage cooperative dairies. There is also a need that Cooperative Society Inspectors be trained along Dairy and Animal Husbandry lines.

There is further a great need to develop the village dairy Industry of India. Men trained at the Agricultural Institute, Allahabad, are trained to assist in this development.

It is said that sixty per cent of the City populations do not consume milk because it is too costly. Yet milk, in outlying villages, is being turned into Ghee, which sells in the bazaar at 14 chattacks per rupee, and at 16 to 18 chattacks in the village. We are only aware of two dairies in India bringing in milk to its plant for a distance of 20 miles by rail or lorry. More of this type of enterprise is needed. The villager will receive more for his product if he can sell it as whole milk, than if he sells it as Ghee. But this milk will require filtering and pasteurization before being safe for consumption. Installation of plants require capital, and capital is usually lacking unless prospects for large profits are in the offing. Granted that village milk could be brought to the cities and processed, a great deal of propaganda would be required to induce consumption even if the price were right.

Also, good milk in the cities competes with poor milk, not on a basis of quality but price. In a country where milk is boiled before consumption the value of hygienic production is minimized in the eyes of the customer. During the hot weather months various methods of increasing the keeping quality have been tried—chemical sterilization of utensils, pasteurization without cooling and delivering hot, and the normal pasteurization and

cooling. The dairyman may do all of these things at a considerable cost, but if he is not protected, against unfair and unscrupulous competition, by milk ordinances and honest milk inspectors nothing but failure can be his experience. Municipalities are urged to realize the situation and take necessary steps.

At the present moment, with Agricultural depression on all sides and quarters of the globe, the outlook for the Agriculturist and Dairyman are not bright. We have no cure-all to offer. But we do believe that times of depression are also times that increase our efficiency and cause changes in our attitudes. Someone has said that if the rural world of India is to be saved from decay a fundamental change in its economic structure and philosophy of life is needed.

Now is the time more than any other when rural workers, including our young diplomates, must propagate the ideas of castration of unfit males, weeding out of the unprofitable cows, and ideas about better breeding and feeding practices.

The prospects are not bright but they exist and can be made better by the application of thought and hard work. Around the Schools and Colleges and Universities an opportunity exists for commercial enterprise which we are glad to see some are using.

* * * * *

University Social Service Leagues.

It is with great pleasure that we note the growth of the idea of social service among students in Colleges and Universities. It has taken the form of village schools, dispensaries and welfare work. Social service work must necessarily have many aspects and classes of workers. Does any one group of workers feel all-sufficient for the task? We would suggest the desirability of linking up all the separate and scattered leagues under some central body. Social service is a creed acceptable to all, for all.

* * * * *

Beekeeping Experiences in India.

Mr. Herbert writes as follows:

"I have given up trying to induce the local variety of the Indian bee to build on frames after many efforts. These bees will not build on the comb foundation nor will they build straight across the frame nor across the hive. They build diagonally and apparently without method and therefore I have found that the usual box hive is useless with them. Moreover they do not stop in box hives, they prefer a hollowed-out log of wood. I have, of course, given them comb foundation of the correct size."

A Home-made Ant Trap.

Two Government entomoligists, in the U. S. A. have worked out a practical system of getting rid of colonies of the little red ants that are so fond of sugar and other sweets, and that torment many housekeepers.

"Take an ordinary cardboard pill box, remove the top, and cut out four small square holes from the inner collar. Pour a thin layer of hot paraffin inside the box to make it water-tight. When in use the top of the box is partially raised to expose the holes and allow the ants to enter. Poison baits attract the ants to the trap, where they either die at once or carry the poison away and spread it among other ants.

"A good home-made bait can be prepared by rubbing a small quantity of tartar emetic into small bits of bacon rind. Another bait which has given excellent results is made by dissolving 4 ounces of sugar in one half pint of water, to which is added 30 grains of sodium arsenate and a little honey. Heat to boiling and strain. The best plan is to have the local druggist prepare this and other baits which contain violent poisons.

"When a syrup bait is used the box should be partially filled with small bits of blotting paper and the syrup poured on the paper. When not in actual use the lid should be pushed all the way down on the boxes and they should be put away where children and pets can not get to them."

* * * * *

Lice and Ticks.

In reply to an enquiry as to how to treat for lice and ticks on cattle, C. H. Parr says :

"I would advise you for lice and ticks, to tri- a decoction of country Tobacco, washing the any mals on scme concrete or brick surface and having a drain to take the fluid off ; also your biers, cattle houses, sheds etc., should be washed with lime wash containing 10 % carbolic acid. All litter, etc. from infested animals should be burnt daily."

* * * * *

The Old Boys' Reunion is approaching.

Mr. D. H. Anjaria, I. D. D. (Manager, Dairy and Poultry Farm, Baria State, Devgad, Baria, P. O. Rewakantha) writes us that he has received a number of letters from the Alumni of The Agricultural Institute, Allahabad, and that all are enthusiastic about the prospects for a huge get-together, to renew acquaintances, extend acquaintances, talk over problems, engage in sports, and in general have a real good time. If you have not gotten in touch with Anjaria—" *Do so now* !"

Visitors are Welcome.

Regardless of the fact that we are about five miles from the Railway station and across the Jumna River, a large number of friends have renewed their acquaintances during the past year, and a large number have favored us with their visits for the first time. In addition to the visits of average people, like ourselves, we have been fortunate in having a number of outstanding Government Officials locate the farm, among them being: His Excellency, The Governor of U.P., The Minister of Education, The Minister of Industries for U. P., Wm. Smith, Imperial Dairy-Expert, F. J. Gossip, Livestock Expert to Govt. of Bengal, Capt. Hickey, Veterinary Advisor to U. P. Govt., and many others that space does not permit us to mention.

Over 350 people have signed the Visitors' book in the Dairy during the six cool months of this last year, not including many parties of students and others who did not ask for a guide to show them around. The names include local people, as well as those from distant states and countries.

* * * * *

Indian Dairy Diploma Examination, 1930,

One hundred percent of the students sitting for the examination passed in the recently held examination for the Indian Dairy Diploma. We were pleased to have Mr. F. J Gossip with us again as the external examiner. His praise and criticisms were appreciated by both staff and students. Also for the first time in the history of this Institution, one of the our students has received "Honours". The credit goes to Mr. Sardar Singh Bhatia. A close second, by only a few marks, was Mr. Narinjan Singh. These men were given gold and silver proficiency medals respectively.

The results in order of merit are as follows :—

Sardar Singh Bhatia.	T. Ahmed.
S. Narinjan Singh.	T. J. Thomas.
K. N. Srivastava.	K. S. B. Singh.
A. K. Chatterji.	C. G. R. C. Rao.
P. J. Patel.	Ujagar Singh.
S. S. Sharma.	S. K. Banerjee.
D. L. Paul.	K. A. Urs.
S. K. Bose.	Surjan Singh Deol.
T. R. Sen.	Bishan Sarup.

* * * * *

Poultry Short Course, Lucknow.

Through cooperation with The United Provinces Poultry Association, Lucknow, six of our graduating dairy class have left for a three months short course. Poultry and Dairying make an ideal combination in many ways. We are glad of this interest in Poultry Husbandry and hope in the near future to open such classes here.

Book Review.

Rusticus Loquitur. *By M. L. Darling. pp. 400. Oxford University Press, Bombay. Price Rs. 9.*—Mr. Darling once again has laid all students of India's Rural problems under obligation to him. He has given an intimate view of the village problems of four differing sections of the Panjab. The book is informing, stimulating, illuminating and scholarly. Neither dry-as-dust nor dullness find place. The book is based upon experience, study and wide reading. The first part is a diary beginning December 3, 1928, ending February 16, 1929. It covers fifty daily marches on horseback, extended to over seven hundred miles. Many Co-operative Societies and Banks were examined.

The book calls to mind, and the title suggests the method of Herodotus. The author reports what he hears, without accepting it as always true, or reasonable. It also suggests Cobbett's "Rural Rides." Although there is this difference between them, Mr. Darling looks on the country-side with the eyes of the economist, strongly concerned with the co-operative movement, while Cobbett rides as a farmer, with a gospel of better agriculture for England. If today I wanted to take up farming in England, I would go over Cobbett's writings knowing that his observations would be of value to me in my quest for a soil of high natural fertility.

While gaining much information from the author's daily marches, there is much that he does not record that the farmer would like to know. The author is interested in the results of agriculture, he sees the importance of better farming, but of agriculture as such there is little in the book. The farmer would like to know the breed, quality and condition of the sheep and goats belonging to the family of Faddis, pp. 7 and 8. The farmer also is interested to know the variety, yield, and cost of production of the various crops, the different cropping systems in the different tracts.

The author is loyal to the Panjab, and lauds its people who are worthy of eulogy. Does the exaltation of the Panjabi cause a depreciation of the dwellers in the less favored provinces? Any non-Panjabis would question:—"But where the rainfall is higher, vitality is low; and where vitality is low character suffers" (p. 67). During my years in India I too have come to admire the Panjab and its folk, and to note their many virtues. Truth however compels me to add that there seems to be something in the Panjab atmosphere that is inimical to the growth of that estimable virtue, modesty.

There are several instances of a curious use of words:

Should not "herd" on pages 17 and 78 be "herder"?

On pages 49 and 283 is not "churn" used to describe the dasher or agitator? Is not the "churn" the "vessel" or container as used in

this sentence on page 49? As I have seen one type of Indian churn at work, a piece of cord is given two or three turns round the handle of the dasher. The person or persons who work it, hold one end of the cord in one hand, and the other end in the other hand. Each arm is pulled in towards the body or thrust out from the body alternately; this causes the dasher to revolve clockwise when one hand is pulled in towards the body and counter clockwise when it is thrust out. Is the author quite clear when he states:—"She turns it rapidly to and fro"? I am not familiar with the idiom "turn to and fro". As one familiar with some of the processes of making butter, I am not sure that the author clearly expresses his meaning in the following: (p. 49) "dung cakes are used to heat the milk and make the cream rise. In the evening this is mixed with curds, and the next morning the whole is churned into butter." The procedure usually followed is that the milk is boiled slowly, which sterilizes it, then some curd saved over from the previous batch of sour milk is added to sour it with bacteria that give a desirable flavour. This curd which has been saved over is usually called a "starter". Having stood all night, the starter has usually done its work by morning and the whole is sufficiently sour to churn. The object of churning is to separate the butter fat from the curd. There is no process recorded telling how curds can be churned into butter. "Taking out men their meals" (p 351) hardly conforms to the demands of rhetoric.

These instances are noted because they are there, but it would not be wise to allow them to influence the mind unduly against the real solid worth of the book, which is great.

The plan of the book is to make most of the diary center round those aspects of village life not adequately dealt with in "The Panjab Peasant in Prosperity and Debt." These are, in general, the peasant's relation to the landlord; religious leader; beggars; cattle; cost of marriages; village industries; status of women; emigration; housing; rural sanitation and rural reconstruction. A lover of India tempted to be impatient at the slowness of the upward trend in the standard of living in the villages will be enheartened by the enumeration of the many examples of progress met with on this tour. I tried to make a list and found it altogether too long to insert in this review. If the educative processes observed—just beginning or well-established—can be patiently, intelligently continued and multiplied, some now living will see a new India wherein the old light will be suffused with the new, and a contented prosperous and happy people dwell. It is this slow, persistent, unhurried, educative programme that will bring results. If only patriotic, enthusiastic young India could see its unsurpassed opportunity to enlarge and

hasten this programme, it would prepare itself for the task.

Without adequate preparation success is impossible.

The author seems committed, along with many other present-day writers, to some theories that some others do not regard as fully established : Birth control ; overpopulation ; against improved farm implements for the village farmer, and other machinery to rid human life of its degrading debasing drudgery, (see p. 64) "to complete one's disgust an oil engine."

The business of agriculture the world over, today, is depressed because more has been produced from the fields, than the present number of people in the world can consume with their present standard of living. By many it is assumed that an increase of population causes a lowering of the standard of living. To remedy this depression two things should happen which are not mutually exclusive : (1) more mouths to feed, more bodies to clothe, more houses to be built ; (2) each mouth to consume more, each body to have more clothing, each house to be enlarged, or in other words an increased population enjoying a higher standard of living. The recent census of the United States shows a population increase of 16.1 in ten years. The standard of living has risen during this period.

India as a whole is not over populated. Millions of acres of good land await people to cultivate them. Some parts of India have congested areas, where the people press too heavily on the land. Far too large a percentage of the population is engaged in agriculture. Some way should be found to get forty per cent. of those engaged in farming of the land into education, industry, manufacture, commerce and transportation. Cheap electric power in the Punjab, with the mechanical bent of certain groups (Sikhs and motors), promises to relieve the pressure on the soil.

India in the production of her staples is in competition with world production. What the present situation in India calls for is to reduce the cost of production. This demands improved methods, and the basis of a better method is improved farm machinery and implements. Cost of production is being continually lowered in those countries which are increasing the amount of power machinery. The author gives an example of the custom of two pairs of bullocks to work 28 acres in Lyallpur which has canal irrigation. This—one bullock to each seven acres with old-fashion country implements—an impossible burden. But with modern implements adapted to the bullock, one bullock to twenty acres is ample. India must come to improved farm machinery if she is to have a favourable margin between cost of production and selling price. The agricultural departments of India have a record of which they may well be proud, yet it is

true that the branch known as Agricultural Engineering is the "Department Neglectum." The Agricultural Colleges have highly trained engineers in almost every branch of engineering except agricultural engineering. In connection with all the big irrigation schemes there is great need for an agricultural engineer. Many mistakes might have been avoided and much progress made had these been attended to. The author reports (p. 249) a fodder cutter out of order and no one to repair it. The limiting factor in the introduction of improved farm machinery is not money, but trained men to maintain it in running order.

Regarding Mr. Gandhi's spinning programme, the author approves. Now if there is no other possible gainful occupation for the small farmer when he has no work on his land, all well and good. But if there were reasonable inducement to make the effort the farmer might devote his time to improving his holding, as for instance, levelling land, terracing, putting in dams to prevent erosion, digging new wells or deepening old wells, drainage, trenching manure, or working at a compost heap, preparing bone for phosphate manure, fencing, protection against wild animals, insect pests and various fungus and bacterial disease, intensive instead of extensive farming. Suc effort would ultimately give a much greater return than spinning. This most Indian farmers know, but the system of land tenure where the landlord takes a fixed share of the produce discourages the farmer. The Panjab saying is that the Batai system makes the landlord rich and the tenant poor. The author cites farmers who had very little left after landlord or money-lender had taken his share (pp. 248-285). He also mentions landlords " who levy dues not entered in the revenue papers but sanctioned by custom". (pp. 293). In some parts of India the illegal exactions of landlord or petty official do more to hinder agricultural prosperity than almost any other cause. Nothing cuts the nerve of effort more than to know that one is not to get a fair share of the increased produce due to one's own extra effort. Between landlord and money-lender the farmer frequently is left with less than he needs to keep him efficient. Why sow for another to reap ?

The manure pit is advised by the author. In many cases it is all that can be done under present conditions. Dr. Fowler at Cawnpore, and Mr. and Mrs. Howard at Indore, suggest that a compost heap properly inoculated, turned over several times, not only increases the manurial value, but greatly shortens the period of rotting. A properly managed compost heap uses all organic waste and quickly converts it into valuable manure.

The author reports that many Panjab farmers keep a cow to produce bullocks, and a buffalo to supply milk and ghee. This is an economic waste. The cow should not only produce the

bullock, but also the milk and the ghee. There is a widespread but erroneous belief that draft quality in the bullock, and milking capacity in the cow are mutually exclusive. Those best qualified to know in India, contrary to the findings of the Royal Commission, point out that a dual purpose type of cattle where draft-quality shall be present in the male and milk capacity in the female are attainable in India. A cow producing forty pounds of milk a day, will generally produce it cheaper than a buffalo will produce an equal amount of milk. There is usually much more body weight to be maintained in the buffalo than in the cow. Therefore more of the ration must go to maintain the body, before any of the ration can go to the production of milk. Until very recently (with one or two notable exceptions) little attention has been paid to breeding to increase the milking capacity of the Indian cow. It is a waste of good food to feed a cow for milk if she doos not have the milking inheritances; it is also a waste of good cow to underfeed her if she has inherited the capacity to produce.

The author examines Mr. Brayne's work at Gurgaon and points out its defects, which are serious, yet in spite of them the experiment is worth all it cost. With a little better atmosphere and attitude it might have succeeded. What Mr. Brayne was attempting is what Mr. Darling also advocates, also Mr. Moreland and the Royal Commission on Agriculture. It is an attempt to capture the citadel of the Indian peasant farmer, to get at his will in terms that the villager can comprehend. Without getting the willing consent and hearty co-operation of the villager no programme for rural betterment can succeed. Therefore all welcome the author's suggestions to deal first with the inner man; once that is won, the expression of that light from within the villager will be fruitful.

This book opens the floodgates and one could go on. But that would be hardly fair to the reader. Get the book and study it. The last chapter deals with the relations between religion and economics. There is needed to-day much further study in this field. There is promise of rich harvest to the one who will work out the economic consequences of social custom and religious belief in India. The book is put in the attractive manner we associate with the Oxford University Press. There is a map indicating the route, an adequate glossary, good index, plenteous footnotes.

SAM HIGGINBOTTOM.

OLD BOYS' REUNION—ANNOUNCEMENT.

Just as we are going to press I can say that the developments warrant the announcement that the Reunion will be held from April 15th to the 18th at which time an Agricultural Fair will also be held at the Institute.

We want 100% attendance of our graduates. Make arrangements to attend. A further announcement will be made later. Watch for it—Don't forget the dates—Make your arrangements.

ANNOUNCEMENT.

Power Farming Short Course.

The annual two months short course in Power Farming Machinery and Tractor Driving will be given this year from April 15th. This course is offered for those who have had at least the Intermediate in Agricultural or have had several years' actual experience in practical Agriculture. To be accepted for this course, students must be able to follow lectures in English. The course is designed to give those knowing something of agriculture a knowledge of the machines which may be worked with mechanical power and applied to agriculture. It presupposes a knowledge of agriculture and is not suitable for those knowing mechanics and wishing to learn agriculture.

This course is planned for the owner of a tractor or for farm overseers where tractor power is utilised. It is not suitable for village boys wishing to become tractor drivers. Several tractors are available for actual practice in tractor driving and for actual work in the field with power machinery. All the large power machines, plows, harrows, threshing machines and chaff cutters, pumping plant and oil engines will be covered both theoretically and practically.

The fees for the course will be Rs. 30 for tuition, the charges according to accommodation in the hostel, and the students will be expected to make their own food arrangements. Kitchen facilities are available. Enrolment will be limited to sixteen men. Applicants are advised to apply early as the class has usually been full in previous years. Apply to the Principal.

Allahabad Agricultural Institute

PURPOSE

The Agricultural Institute was founded in 1910 by the American Presbyterian Mission. By giving men both practical and theoretical training in modern methods of scientific agriculture and dairying, as well as a thorough general knowledge of the sciences underlying these, it hopes to help India fight its problem of poverty.

LOCATION

The farm and grounds of the Institute are across the Jumna River from Allahabad proper, about three miles from the Allahabad Station (E. I. R.) and two miles from the Naini Station (E.I.R). Besides being easily accessible, it is very beautifully located on the banks of the Jumna River.

STAFF

The staff consists of twelve men, Indians and Americans, trained in agriculture, dairying, engineering and sciences.

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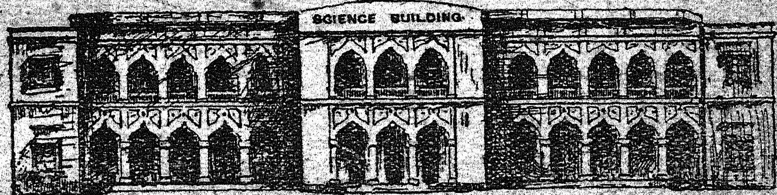

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IMPROVEMENT OF DAIRY CATTLE IN INDIA.

Dr. Sam Higginbottom.

While it is true that India possesses the best breeds of cattle within the tropics, due to certain circumstances, very few of these breeds, as a whole, are economically profitable; that is, the cows do not pay for their keep by the milk and the off-spring they give; and the bullocks do not pay for their keep through the work they do. The annual economic loss due to poor quality cattle runs into crores of rupees. One of the chief reasons for this annual economic loss is that there is very little selection for breeding purposes, generally the cattle, good, bad and indifferent, are allowed to multiply and reproduce. The first law of Biology is "Like Begets Like". If poor quality cattle are mated, poor quality cattle results. In very few parts of India is any intelligent effort put forward to breed only from the best to carefully select the sire and dam. Then from the off-spring of the best selected cattle ruthlessly cull the off-spring that fail to come up to a certain standard of quality and excellence.

The history of the development of the best breeds in the world today is the record of the very careful mating of selected parents, and then selecting from the best of the off-spring of these selected parents, discarding any animal of good parentage that did not have (as an individual) desirable qualities. This must be a continuous process throughout the generations.

The breeds of India unquestionably can be improved, as have the breeds of the West, by the same careful control. It will be a long process and slow; but improvement of indigenous breeds can be brought about and most certainly ought to be brought about if continuous selection is followed. This is exceedingly difficult in India because there are certain aspects of the cattle question that are not considered from an economic view-point: and yet these non-economic concepts of the cow have much more weight and authority among the population at large than the strictly economic aspects.

Because of the sporadic and slow progress made in improving the indigenous breeds of cattle in India by continuous selections, certain people that have had urgent need for large, dependable supplies of milk, produced at a cheap rate, have imported bulls of the noted dairy breeds of the world: Ayrshire, Dairy Short-Horn, Holstein-Friesian, Jersey, Guernsey and Brown-Swiss. These have been mated with the females of various Indian dairy breeds. The half-bred female from such matings, as a aule, has given much more milk than the Indian mother. We have instances where the daughters of Indian cows sired by an imported bull have given from two to eight times as much milk as the Indian mother. The Government military dairies have several half-bred cows that have given over fifteen thousand pounds of milk in a lactation period. Many more that have given over ten thousand pounds of milk a year. There are very few purely Indian cows that have given ten thousand pounds of milk at a lactation period.

At Pusa the herd of pure bred Montgomery cattle has been carefully selected for years. Yet the off-spring of the poorest Montgomery cows mated to Ayrshire bulls have a daily average, extending over several years, of several pounds of milk a day more than the purely Indian improved cows.

A great many people say that if the half-bred does so well, then why not go further and get the three-quarter-or-more bred cow which should be even better than the half-bred? There is a fallacy in this argument. Experience seems to show that, with very few exceptions, the three-quarter bred lacks constitution and stamina.

In the co-operation between the Indian cow and the foreign dairy bull the Indian cow provides three indispensable factors for successful dairying in India. First, the ability to stand the rigours of the Indian climate which has an exceedingly wide range of temperature. The Indian cow goes on producing normal amounts of milk right through the hot weather where imported cattle would almost certainly dry up and suffer severely in the hot season. Second, the Indian cow has a very large degree of immunity to disease. There are diseases that often seriously affect or destroy imported cattle. Several promising attempts at raising herds of dairy cattle of foreign breeds have been cut short in India because of some epidemic which completely wiped out the imported cattle while the Indian cattle round about suffered very little. So that this immunity to disease is one of the indispensable factors. Third, the Indian animal has a very high digestive efficiency. It frequently has had to subsist for long periods on small amounts of coarse fodder containing very little digestive nutrient. Any animals that cannot subsist on a minimum of food, die out. The result is that many Indian cattle

have developed a degree of digestive efficiency much greater than imported cattle. By this is meant that if a certain amount of some of the coarse fodder grasses of India, containing one hundred units of digestive nutrients, is fed to imported cattle and to Indian cattle, the imported cattle will frequently digest not more than one half of these nutrients, whereas the Indian animal may digest upto btween 80 to 90 per. cent. In practical working this means that an Indian animal can thrive, where the imported animal would starve to death. So that when we are considering cross-breeding we must remember these three very highly desirable characters which the Indian cow possesses, and which she transmits, in whole or part, to her off-spring :—ability to stand the climate, a degree of immunity to disease, and high digestive efficiency.

The foreign dairy bull contributes as his part the capacity for milk production. Milk production is one of a large number of factors. The cow in order to have large milk production, must have a good constitution, must have stamina, must be a well-formed and healthy individual, must have a large digestive capacity; because the amount of milk that a cow gives depends upon her ability to convert the food she eats (after meeting the requirements of maintaining her body) into milk. The cow that eats only a small amount of food cannot produce a large amount of milk. A large digestive capacity is impossible without a good circulatory system. The dairy animal has been bred so as to convert the food she eats, not into fat or flesh to make her body heavier, but into milk. A study of the best dairy cows of the world today will reveal almost without exception that the cow possesses in an unusual degree all the desirable qualities of good health, stamina, constitution, mental alertness, high digestive efficiency and capacity and good circulatory system denoting physical energy.

When an Indian cow is mated with an imported dairy-bull we have a right to expect, in a certain number of the offspring (possibly from 20 to 25 per. cent.) the inheritance of the desirable qualities of both the parents. The other 75 per. cent. will have various mixtures of qualities which may make some of the animals unsuitable from the breeder's point of view, who is working for increased milk capacity.

I believe it is possible to establish in India new breeds of cattle from Indian cows and imported dairy-bulls. In any given experiment great care is needed in selecting the Indian cows. Only one breed of Indian cow should be chosen at a time and from within that breed, the most typical cows should be carefully selected. These cows should be tested for tuberculosis and Johne's disease and inoculated for rinderpest. They should have good confirmation and be good, strong, healthy individuals. They should be

mated with equally carefully chosen sires of the dairy breed selected. It is well in order to prevent close in-breeding to have two imported bulls of a given breed to mate with a certain number of Indian cows of the breed selected, so that in the second generation we have half-bred cattle from the same Indian and foreign breeds with different sires. If we choose, say Scindi cows and two Holstien-Friesian bulls A and B, we should mate the halfbred Holstien-Friesian-Scindi bull from A to a half-bred Holstien-Friesian-Scindi heifer sired by pure-bred Holstien-Friesian bull B.

If only 25 per cent. of the half-breds are likely to transmit the desirable qualities inherited from both parents it is extremely difficult and important to select this 25 per. cent. One cannot tell by looking at a bull or a heifer whether he or she has the power to transmit the desired qualities. The only thing to do is to mate the carefully selected half-bred bull with carefully selected half-bred females and wait until the daughters of such mating come into milk. If these daughters show an increase in milk over their mothers, the chances are that the bull has the power to transmit the desired qualities and characters. If, however, the daughters of such mating give less milk then their mothers the bull most likely does not have the power to transmit. Such a bull should then be sent to work at the plough.

If the herd is large enough, about half a dozen carefully selected half-bred bulls should be used, each one with 6 to 10 carefully selected half-bred females and their off-spring tested. Out of these half-dozen carefully selected half-bred bulls it may be that one or two will demonstrate the power to transmit the desired characters. These should be used and the others discarded. This selection and culling is what makes the establishment of a new breed from the half breeds, so slow. But the reward to India is so great, if success is achieved, that it is well worth the trouble of making the effort. A recent writer from one of the greatest centres of animal breeding in the world says that to establish new breeds from half-breeds is too much of a gamble to justify the expense, especially since the method of selection from within the indigenous breeds has proved itself to be sure of results.

In India owing to the religious regard for the cow it is almost impossible to secure the rigorous treatment necessary to improve by selection. Again where the method of improvement by selection has been tried under favourable circumstances, progress has been so slow and on such a small scale, that the other method of importing dairy-bulls and cross breeding seems justified

I urge that improvement of Indian breeds by selection and culling be continued, but along with this, where facilities

permit, cross-breeding be continued. The cross-bred cows will usually pay for themselves in the amount of milk they give. The cross-bred heifer usually comes into milk at least a year earlier than the pure Indian. This is a great saving.

Many object that these half-bred animals need greater care than the purely Indian animals. It is doubtful whether an Indian cow giving as much milk as a half-bred does not need just as careful treatment. The more any kind of live-stock is improved the greater is its dependence upon man and the more effort man will have to devote to it to maintain it. An Indian gentleman who owns race horses and polo ponies expects to give them much better care than the ekka-walla gives his hardy pony.

If almost all the indigenous cattle of India are improved by selection and culling, they then will need much more careful treatment than the unimproved stock. The gowala of Guzerat treats his buffalo or cow like a member of the family. Its every want is studied and satisfied. In such a friendly atmosphere many of these cows and buffaloes do quite well; but put them into a village herd and treat them as village cattle are treated and their milk yield invariably goes down. Again, objection is made that half-bred bullocks are not so good or hardy as pure bred Indian oxen. Our experience over twenty years is that the half-bred ox is every whit as good a draft animal as the best Indian ox. Not all Indian oxen are good workers. Many of the good breeds, like the Hissar, fail when tested behind the plough or cart. My experience is that the number of failures among the half-bred oxen is no greater then among the Indian oxen.

To sum up! Improvement of Indian breeds by selection and culling should be carried out; but not to the exclusion of trying to give India several new breeds from imported dairy bulls and Indian cows.

The half-bred cow almost invariably pays for her board with some profit.

She matures at least a year earlier than Indian cattle and thus saves a year's feeding expenses.

Half-bred bullocks are good draft animals.

SOME INTERESTING FEATURES OF THE ALLAHABAD WHOLESALE VEGETABLE MARKET.

S. K. Roy.

In my last article on the marketing of vegetables in the wholesale vegetable market here, I pointed out how each vegetable has to pass through several hands before it finally reaches the consumer. I also showed how this kind of transaction causes a considerable loss to the two parties mainly concerned in the bargain, namely the grower and the consumer.

In this article I would like to mention very briefly about one of the many interesting as well as the deplorable features of the vegetable market here, namely, the handling of vegetables. I shall try to continue the other features of it in the next issues of this paper.

1. *Handling of vegetables*: The keeping quality of any vegetable depends mostly on the way it is handled while it is picked, loaded, carted and marketed. From the way most vegetables are handled in the market, it seems to me that the soil in which they are grown must certainly be possessing certain unsual elements to make them so hardy that in spite of such cruel handling they still reach the hands of the consumer somehow or other. The skilled vegetable grower in America who feels that even the temperature of the hand is injurious to some vegetables and hence suggests the use of gloves at the time of plucking and handling of it, would certainly get astonished to see the treatment given to it here in Indian markets.

Take for example the potato. Bags containing potatoes kept in the market are used in place of chairs and beds, for sitting and sleeping. Also they furnish to some a very good platform for taking a sun bath and going from one end of the market to the other, so that by the time the contents are taken out most of the potatoes get so badly bruised that all their keeping qualities are lost. The bags of potatoes are loaded or unloaded as if the contents were stone or pieces of iron. An average bag contains a maund and a half of potatoes. A purchaser requiring a maund and a half or more could easily examine the contents by opening a few bags and can have the required amount weighed in bags on a large scale. But according to the custom of the market as the people call it here, he would have the whole bag dropped on the ground, which in most cases is done very roughly and then weighed by a five seer weight which causes weighing the contents of a bag twelve times instead of once. He thinks that if at each weighing he succeeds in getting one or two potatoes more, he has gained quite a bit, while as a matter of fact

so much handling bruises the potatoes very badly and reduces the keeping qualities several times more than what he has actually gained.

Another interesting thing in this connection is the method by which potatoes are peeled by the retail seller to be made more attractive to the customer. Potatoes and other vegetables bought by the retail seller are taken to the retail market in baskets on the heads of coolies. After buying the potatoes from the wholesale man the retail seller instructs his coolies to peel and wash them before taking them to the retail market. The coolies, therefore, take these baskets to some tap in the wholesale market and then placing them under the taps rub the potatoes with their feet, which, of course, in most cases are awfully, dirty carrying with them all kinds of disease germs. It is a good thing that this helps to wash their feet and the two processes go on together until the potatoes are peeled, and made attractive by the dirt and filth of the coolies' feet.

Take for illustration another vegetable, the long gourd or *lauki* as it is called in Hindustani. Each gourd has to receive hundreds of inoculations before it is purchased by a customer. The customer requiring one gourd, would thrust his finger nails into at least two dozen of the gourds before he is able to find one tender enough to suit his taste. Each gourd therefore gets hundreds of these nail marks and inoculations of all kinds of disease bacteria before it is purchased by someone.

The above description is only about two vegetables. The other vegetables receive no better treatment before they reach the consumer's house. Space does not permit me to give more illustrations, but I think the above two are sufficient to reveal to the reader how most vegetables are handled in the market.

THE OCCURRENCE OF FROST.

B. Pugh, B. Sc.

A rather heavy frost occurred on our farm and on neighbouring places the evening of the 6th of February. The damage done to the crops on the farms has been in some cases serious. The damage done was particularly on the Linseed or Alsi crop, the cucurbits such as pumpkin and gourd, on mustard and also on the younger plants of wheat and gram.

This is rather unusual for Allahabad although a more serious frost happened only a few years ago. This by the way seems to point out the observation usually made that some of our heaviest frosts occur in the first and second week of February.

Frost does not always come without a warning. As a matter of fact, the weather bureau can predict frost for a certain area. Methods of prevention also are now being adopted by scientific farmers, and we feel a few facts about frost may not be out of place here.

To many people in India, frost is unknown, and to many more people in this country, frost and dew are supposed to be the same. This, however, is not the case.

Dew is water that has been formed on the ground or on vegetation when the temperature of the object on which dew is being formed is at, what is called, the dew-point. This is again dependant on the amount of water vapour that is present in the air. The greater the amount of water vapour present in the air, or, in other words, the greater the humidity of the atmosphere, the nearer will be the dew-point, to the temperature of the air. This dew point is always above freezing point, that is, above 32 deg. Far. But frost is frozen water and is formed only when the temperature of the object on which it is formed is at a temperature of 32 deg. F. or below.

Many people in Allahabad probably will dispute this fact, since the temperature of Allahabad was never reported to be anywhere near freezing on the morning of the 6th of Feb. May we remind them, however, that the temperature of the air reported in the papers is taken several feet above the ground. The temperature of the upper layers of the air at night are usually higher than the temperature of the air close to the ground. Again, the temperature of the object like a moist soil from which water is being evaporated or of the vegetation from which moisture is being transpired, is considerably less than the temperature of the surrounding air. In the process of evaporation, heat is necessary and this is lost either to the soil or to the plant, which therefore chills both the soil and the plant.

Still another reason why the temperature of the air above the ground is higher than that next to it is because colder air is always heavier than warm air. The coldest air therefore is close to the ground.

No wonder therefore that the temperature of the air above the ground may be several degrees higher than the temperature of the object on which frost is being formed. This is especially true if there is no rapid circulation of air, as usually happens in a calm night. A free circulation of air helps the mixing up of the cold and warmer air as it were, and therefore prevents the formation of frost. So frost formation will not usually take place on a windy night. Frost will not take place also when the nights are cloudy, because clouds prevent the rapid evaporation of air, and also the radiation of heat which has been absorbed through-

out the day by the soil and also by the vegatation. In order to have frost, therefore, the sky must be clear and cloudless.

A farmer may therefore expect frost when the temperature of the air is about 8 or 9 deg. above the freezing point, since the temperature of the ground is lower than that of the air above it. If a farmer can also determine the dew-point he can, with a good deal of accuracy determine whether freezing will take place during the night. If the dew-point during the afternoon is above 40 deg. F. the temperature will very seldom fail to come to freezing point during the night. This is so because when the dew-point is reached, further cooling is retarded by the heat of vapourization set free when dew forms. And as already explained before the greater the humidity of the atmosphere the higher will be the dew-point. The higher temperature of the dew point therefore is an indication of a greater amount of water vapour present in the air. This water vapour helps also to retard the radiation of heat from the soil.

This being so, a farmer, in order to prevent the formation of frost, should adopt such methods as (1) would prevent a rapid radiation of heat from the soil or (2) increase the water vapour present in the air or (3) help to increase the circulation of air or (4) warm the air directly.

Some of the devices generally used in order to prevent radiation of heat from the soil are too costly for an Indian farmer when farming is done on a large scale and with such crops as Linseed, Gram, Mustard, Wheat and the Cucurbits. The methods that may be mentioned here are:- (1) the use of paper covers for garden flowers and vegetables, (2) the use of lath-screens for small trees or plants, (3) the use of glass screens for green houses and hot beds. Some of the methods used for heating the warm air directly consists of (1) The burning of coal in wire baskets, using 20 to 40 such baskets to the acre, (2) the use of smudge pots; forty or fifty such pots being used to the acre for orchards.

Some of the methods used for increasing the amount of water vapour in the atmosphere consist of (1) Spraying and sprinkling plants in times of threatened frost or before sunrise on frosty mornings, (2) irrigation. The protection in this last method is also due to the high specific heat of water which retards any change in temperature. On the other hand, frost is more likely to form on moist ground due to the rapid evaporation as already explained. Proper drainage however, has been known to be effective in preventing frost formation in moist soils.

Finally the farmer should remember not to plant such tender crops as the Cucurbits in low places where there is practically less wind circulation.

A SHORT NOTE ON GOATS.

N. R. JOSHI., I. D. D.

From time immemorial the goat has had an important role in the life of mankind as a supplier of milk and meat. In the early nomadic stages of civilization it had a prominent place among the domesticated animals. With the onward trend of civilization its place was taken up by certain other animals. It has been truly said that the goat attains its importance in the first and last stages of the development of Agriculture. In the nomadic stages we want an animal that would sustain under range conditions. Under the intensive condition where the land is at its premium and feed is costly the well-bred goat again proves her ability as an economic producer.

Unfortunately through some reasons or other the goat is not a popular animal with the middle class people in India. There are however many families where the cow proposition is impossible or impracticable and yet the desire for a supply of pure, wholesome milk is present. It is to this class that the goat proposition should appeal. The single unit of our cow in both troublesome and expensive for a middle class family. But the unit divided into several parts could become both easy to handle and inexpensive. A goat is truly said to be "A poor man's cow." Apart from its comparative ease and inexpensiveness goat's milk is supposed to be an ideal food for infants, reaching the standard of women's milk. Goat's milk has got all the necessary nutrients such as fats, protein, sugar and minerals, in perfect combination for the development of young ones. The fat in its milk is in much smaller quantities than the cow's or buffalo's and hence it is more easily penetrated by the digestive juices. The casein in goat's milk forms a flocculent rather than hard or cheesy curd and hence it is more easily digested. Goat's milk is alkaline in reaction, unlike cow's milk, a matter of great importance to people suffering from hyperacidity. Apart from this, goat's milk is practically free from tuberculosis, a very grave danger in cow's milk or buffalo's milk. It has been stated, however, that the characteristic unpleasant flavour in goat's milk is an unfavourable feature. As a matter of fact goat's milk can be as sweet in flavour as cow's milk if the animals are kept under clean and proper conditions. Two causes are mainly responsible for this "goat flavour" namely :—

(1) The uncleanliness of the animals, and (2) the constant company of the bucks with the does. These bucks specially in the season have a peculiar unpleasant odour about them.

Selection of Goats:—It is but natural when purchasing a goat that the first consideration should be the milk pail. Because it costs

no more to feed a goat giving three or four seers than one that gives only one seer and the buyer should not grudge to pay an additional price for such an animal.

In a doe, the head should be neat and feminine and not coarse or rough-looking with forehead broad and tapering towards the muzzle. The body should be long and deep, giving ample room for a large stomach. It is an established fact now that a heavy milker is wedge shaped, that is much deeper at the hind quarters than at the chest. The skin should be thin and loose with hair rather soft and fine. The udder should be large but at the same time should be thin in substance and soft to the touch. A goat may have a large udder and yet give comparatively little milk supply on account of its fleshness. The teats should be of convenient size and should be fairly long and tapering pointing forwards. Always avoid a dull looking goat because healthy goats are usually alert and active with bright intelligent eyes.

The buck should show a high state of vitality and vigour and at the same time it must be the progeny of a good milker.

Breeds:—There are several Indian breeds of goat which through lack of interest and injudicious breeding have deteriorated to a great extent. The most prominent among the breeds are the Jumna Pari, the Barbari, the Chitral, the Gujerati, and the Kuiaad, of the south. It is surprising to know that the famous English breed Anglo-Nubian is an established cross between the Barbari and the indigenous English goat. The famous buck Sedgemere Chanceller which was largely used in building up the Anglo-Nubian breed, was exported, from India.

Management.—Milch goats, like dairy cows, respond readily to good care and managment. Without doubt the most crucial period in goat managment is the kidding season. The does should be kept in separate pens before kidding. Milch goats are very prolific usually dropping twins or triplets and having a gestation period of about five months.

They breed almost immediately following kidding. But it is always a safer practice to breed them in such a way that they will kid three times in two years. This gives a lactation period of about six months and a short dry period of about six to ten weeks. In order to ensure largest production they should be allowed enough rest period. A young doe may be bred for the first time when she is about 18-20 months old.

Feeding.—Goats are primarily browsers and so the majority of them kept in this country are used to clean up brushes and weeds on waste lands, but it can not be expected that they will produce their maximum when kept under such conditions. The feed required by the goats is pretty nearly of the same nature

as for dairy cattle and whenever possible they should be allowed some hay and a little nibbling at different brushes. Grain will also be needed in the case of good producers. A doe of average good production should receive 1 to 2 pounds of grain. The bucks, specially in the breeding season, should receive some allowance of grains; and the also should be kept separate from the flock of does. Salt and water should always be accessible to goats.

Milking.—Goats must be milked in quarters separated from where they are stalled or the milk will otherwise be tainted. Milk from ruttling does should not be used and to ensure a palatable supply the bucks must be fairly well removed from the milking stall. Before milking the udder should be thoroughly cleaned and then the doe may be milked either from the side or from behind. The actual milking consists in grasping the teat close to the udder with the whole hand and pressing it against the palm with the fingers. By maintaining a succession of compressions and relaxation the milk flows freely. An occasional quick punch into their udder, following the practice of the kids will bring down the reserve supply.

Health of Goats.—The goat as a rule is a hardy animal; nevertheless it is subject to disease same as other domestic animals. The simple rules of providing the animal with adequate. clean and proper feeds and clean, comfortable and sanitary surroundings will go a long way to prevent most of the common ailments. Here, it may be well to sound a note of caution that the goats do not do well on wet, low and marshy places.

References.—1. "Profit and Pleasure in Goat Keeping" by Fred C. Lorenburg.

2. "Modern Milk Goats" by Richards.
3. "The Milch Goats" by A. C. Mecandlist and Gillette.
4. "Money in Goats" by W. Sheldon Bull.

LUCERNE.

S. R. Misra.

Part I.

Lucerne has been known to exist in some portions of the world from olden times. In the highly agriculturally developed countries of the west its value in profitable agriculture and dairying has been for long well realised. Lucerne is a synonym to Alfalfa. The name "Alfalfa" is from an Arabic word (Alfaf, plural from Laf) meaning intertwining grass. Its native place

is said to be central Asia, wherefrom it had been introduced to many western countries mostly by invaders. The name Lucerne which is mostly used in France and England, is probably from a spanish word 'Userdas' which the French finally changed to lucerne Lucerne is known by many names in various countries of the world. Its introduction in India seems to be known from about a hundred years. Lucerne entered India from the north west where it is yet grown on a large scale, and seeds obtained from the north-western countries, Baluchistan, Afganistan, etc. Lucerne has been grown mostly by the military cantonments in India for feeding horses. Its value in agriculture seems to be slowly but steadily recognized now as it is found to be growing in scattered patches in many places of the well-irrigated villages in the Deccan and Gujrat and some other places too.

Lucerne belongs to the botanical family Leguminosae. Its botanical name is *medicago sativa.* It is a true perennial plant ordinarily growing one to four feet high. The purple pealike flowers are scattered along the plant's stems and branches and its leaves are three parted, rounded in outline and slightly toothed toward the apex. The matured seed pods are spirally twisted. The seeds are kidney shaped and in colour at their best are olive green or bright egg yellow. There are three varieties of lucerne generally known in India, the Kandhar or Quetta, the Persian, and the Meerut. The Persian or Arabian variety perhaps does best under most circumstances.

Soil and Climate. Lucerne has shown its adaptability to nearly all climates and soils. It is profitably grown in Europe, America, Australia and most of the Islands of the sea. It gives crops at an elevation 8000 ft. above the sea level. In southern California it grows below the sea level, giving good crops. In India it has been successfully grown under extreme climates. It has borne a temperature up to 105 to 110 deg. F. in the hot parts in India. In cold resistance it is still more remarkable. It has done well with 14 inches to 65 inches of rainfall. Lucerne is sensitive to long continued humid atmosphere accompanied by high temperature. It becomes unhealthy during the rainy season. Dry atmospheric conditions are more suitable to lucerne.

The most favorable land for lucerne is rich, friable, warm, somewhat sandy loam with a deep and loose subsoil well supplied with lime. A dense clay or hard pan subsoil is unfavourable though it has been grown well on ordinary clay and black soils provided they had not contained excess of salts. There are two soil conditions which lucerne cannot tolerate. The first is the soil which is constantly wet as the common remark "Alfalfa will not stand wet feet" shows. It does not do well where the water is nearer to the surface than six feet. Water logging is a serious menace

to its growth. Provison of thorough drainage for lucerne is absolutely indispensable. The other kind of soil where lucerne will not grow is where there is too much acidity. This should be rectified by the application of lime.

Preparation of Soil. Lucerne must have good advance preration of soil for its satisfactory growth. Western farmers who are rich in experience of raising alfalfa begin the preparation of soil two or three years before they sow the seed. The precede alfalfa with such crops as maize, millet and cowpeas with deep cultivation and liberal manuring, introduce bacteria and thus prepare the way for lucerne. Weeds are a great handicap in lucerne growth and their eradication is an absolute necessity before seed is put in. With this object in view the field to be sown with lucerne should be given a deep ploughing in summer. Clods will crumble and weed seeds and roots will scorch under sun. Soil will be open to soak in rain water. During the rainy season, weeds would be induced to grow and plowings should be done at intervals when weather permits and the soil is not too wet. These plowings will greatly help in the distruction of weeds. When the rains are over, rotten farmyard manure about 300 mds. per acre should be applied and well mixed in the soil by plowings and harrowings. By the middle of October, the field thoroughly clean of weeds and brought to a fine texture should be ready to be sown with lucerne.

A soil given a thorough cultivation and good humus supply will mostly have bacteria or would at least be ready to make response to the bacterial life attached to the lucerne seed. If even on such a soil lucerne is unthrifty or fails to make good a stand, examination of the roots will fail to discover nodules which are the homes of bacteria, microscopic vegetable organisms obtaining their sustenance from the atmospheric nitrogen and the starch of the plant. Then inoculation is necessary. There are several methods of introducing the bacteria in a lucerne field. One method is the transferance of soil from an established lucerne field. Soil from the top six or eight inches including roots and stubbles from the previous lucerne-grown field should be spread upon the field or sown with the lucerne seed at the sowing time. An application of two to three hundred pounds of infected soil should be quite enough for an acre. The field where lucerne is intended to be sown, may be sown with a few pounds of lucerne seed six months or a year before with the preceding crop to introduce bacteria. This method is free from those risks which may attend the soil transfer which may introduce various weed seeds, fungus or bacterial diseases from the old field. In this case the source of the infected soil should be definitely known. Watering the soil with the washings of an old lucerne field is also one method.

Seed and Seeding.—Good crops requires good seed. Lucerne seed must be free from foreign seeds. Old and dead seeds should not be planted. It will be the safest course to test the seed for purity and germination before sowing. About 90 % germinable seeds should be used. The amount of seeds required per acre depends upon many factors such as the vitality of seed, soil, weather conditions at the sowing time or immediately after and the method of sowing. There have been wide variations between the amounts of seeds used per acre. Other conditions being good, seeds used from 12 to 15 pounds per acre have given the most satisfactory results under most conditions.

Sowing of lucerne on ridges is superior to sowing it broadcast in many ways. Ridges provide convenience for weeding and drainage and keep off the plants from surface water. Amount of seeds required per acre is less than when sown broadcast. The method of sowing lucerne more frequently used in parts of India where lucerne has been grown is to broadcast the seed in beds about ten feet square. This method may do well on light and well-drained soils but under other conditions the ridge system gives the best results. The Agricultural Institute has been growing lucerne succesfully for about six years. Here lucerne is grown on ridges about 1½ ft. apart in single row. Three rows on one ridge, about 2 ft. wide has also been sown but the middle row seems to get less moisture and is more affected by weeds. Two rows on one ridge should be level, not too high and the top well pulverized. Seeds can be sown by an alfalfa-seeder if available, otherwise they can be sown by hand. After sowing, seeds should be lightly covered with soil, say about one inch of soil. Seeds should be dropped in such a way that they may come out in a width of three to four inches. On the Institute farm when a new plot is sown with lucerne or re-seeding is done in an old plot, seeds are mixed with well pulverized soil of the established lucerne field and then sown. This method besides introducing bacteria regulates seed fall and the plant growth is more even. Heavy watering after sowing must be avoided.

Lucerne may be sown any time not before September and not later than December. The best time of sowing is from the middle of November. Any later sowing does not allow the plant enough time to establish its roots before the summer sets in and the crop gives a poor stand.

WHAT CAN BE GOT AT A POST OFFICE.

In India the principal clients of the Post Office seldom themselves visit the local post office but send their servants or chaprassis to transact their postal business. The result is that they are often unaware of what the post office has to offer them.

That stamps can be bought at a post office everyone knows, they also know that they can get neat little booklets of one anna stamps. But few people seem to know that they can also buy equally neat little booklets of 2 anna stamps such as are required every week for the letters for England.

At all important offices air-mail stamps of 2, 3, 4, 6, 8 and 12 annas can be bought. At present the 2, 6 and 8 anna air-mail stamps are mostly used but one's friends in Europe would welcome combinations such as 4 and 6 annas, 4 and 2 annas. The air-mail envelope with the blue label and 8 anna air-mail stamp printed on it is useful and attractive. They are sold in packets of 8 envelopes at Rs. 4 annas 2 and singly at 8 annas 3 pies. People however who use the air-mail (and their numbers are increasing daily) should be wary and realise that the air-mail fee is for half an ounce while the postage is for a whole ounce. Thus for an air mail letter weighing an ounce, two air mail fees and one postage is required.

Most people know that the post office supplies envelopes embossed with an anna stamp. The post office sells 16 of these for one rupee or one for an anna and obligingly throw in the envelope for nothing. Few people are aware that they can buy British postage stamps of ½d., 1d., 1½d. and 2d. at the principal post offices. These are useful in a variety of ways ; for example if you want to enclose a stamped envelope to be posted in England or you want to pay for a reply from England by letter or postcard or you want to remit any of these small sums. Incidentally a letter and a postcard sent from England both cost 1½d. and a postcard from India to England costs 1½ annas, not 1 anna.

People who indulge in much registered and insured correspondence should buy the post office registration envelopes which are sold in three sizes 7½ by 5½, 9 by 6½ and 14½ by 8½ inches. They are stout and protective and well worth the ½ anna or 1 anna extra.

Very few people seem to be acquainted with the international reply coupons and imperial reply coupons which can be bought at the larger post offices for 4½ and 2½ annas each and can be enclosed in a letter to prepay the reply.

A most useful article sold at all post offices is quinine in its purest and cheapest form costing Rs. 3-14-6 for a tin of 250 tabloids

or 1 pice per tabloid. In a country where malaria is so common and so deadly this facility afforded by the post office is invaluable.

Identification Cards.

It may interest secretive persons to know that they can send and receive their postal article in a locked bag. Tourists, travelling representatives, and others can get from the post office identification cards to establish their identity in obtaining registered and insured articles and payment of money orders in the post towns through which they pass.

Most people are familiar with the facility which the post office gives for insuring letters, etc., but few realise how cheap it is, only 2 annas per hundred rupees, that is one eight per cent. Another useful facility is the special acknowledgement for a registered or insured article which the sender can get from the addressee by paying an extra anna on the registration fee of two annas. Incidentally the post office will, as an act of grace (though it usually does), pay compensation up to Rs. 25 for loss or damage to registered uninsured articles.

Another little known facility is that, if you miss the letter mail you can send a telegram to the sea or air port and get it posted from there by ship or aeroplane. This is a considerable convenience when you happen to miss the post or cannot make use of it in time.

A Wealth of Useful Information.

It is extraordinary how few people buy that very useful publication, the Post and Telegraphs Guide, which can be bought at any of the larger post offices for eight annas a copy or a rupee a year. Even those few who buy it are content to keep obsolete copies rather than to register their names as subscribers and thus arrange to get the new editions containing the latest postal and telegraph arrangements. This Guide contains a wealth of useful information which people are constantly requiring. The possession of it will save many telephone calls or messages to the local post or telegraph office and eliminates the chance of getting incorrectly heard information.

REPRINTED FROM "THE PIONEER."

REVIEW OF SOME BREEDING EXPERIMENTS CARRIED OUT AT THE U. P. POULTRY ASSOCIATION'S DEMONSTRATION FARM, LUCKNOW.*

By Mrs. A. K. Fawkes, Secretary, U. P. Poultry Association and Poultry Expert to the U. P. Government.

The primary need for an egg-producing breed of fowl that will be more immune to the Indian climate and conditions than imported poultry are has led the Association to conduct experiments to endeavour to discover such a breed.

After following up some experiments in crossing Chittagong hens with Rhode Island Red males the experiment was relinquished owing to two drawbacks: (1) the prevalence of broodiness in the progeny, and (2) the pugilistic tendencies of the progeny, who from chickenhood fought so constantly that the area of land required for rearing them satisfactorily was not available. Otherwise the progeny were fine birds and fair layers.

A further experiment has been made between crossing local hens, with high producing Leghorn males. These experiments are still going on, but they do not seem to indicate any remarkable improvement in the egg yield of the progeny. Individual high records have been obtained but flock averages do not tend to indicate that Indian village hens mated to pure bred males will produce a definite increase in egg yield, the dominant zero breeding factor of the Indian hen, nullifying the attainment of better flock production in the progeny. In all other respects the improvement is marked.

We realize that to obtain satisfactory results we must look for an indigenous breed of which the females were already good layers. We happened to come in touch with a breed of hens in Western India commonly known as Bussorah or Busra fowls. These birds are fairly common around Bombay and are imported evidently from the Persian Gulf.

In 1926, we purchased four hens of this breed from Bombay and trapnested them and a record for four years of their winter laying is appended.

One hen met with an accident and had to be destroyed in 1928, the other three hens (now 5 and 6 years old) are still with us and are laying 30 eggs or so during the winter months.

The Busra hen is a typically built bird for egg production. A deep bodied bird, tight in feather, alert, and though smaller than a Leghorn in appearance, weighs 4½ lbs., as a pullet. The breed

* Reprinted from the Madras Agricultural Journal. Vol xix, No. 1. p. 2.

is distinguishable by its semi-buttercup comb, grey legs and tuft of feathers on head.

The colour varies, and requires stabilising, but the main characteristics of the type are apparent in all colours. The egg is a large white egg, in many cases reaching the 2 oz. standard. Broodiness is not so troublesome as in country hens, the broody period is easily broken and within a few days the hen returns to lay. This breed therefore seemed to us worth cultivation. We therefore trapnested the original Busra hens and the record is given in the appended tables.

The following year we experimented in crossing these pure Busra hens with a White Leghon male. The eggs hatched well under artificial methods, and the chickens were reared most easily showing rapid growth, little or no mortality and immunity to the hot season conditions. We therefore selected a group of pullets and trapnested them during the winter season (the period recognized by poultry breeders as determining the future laying powers of pullets) and we give, in the appended charts, the results of our first cross experiments carried out in three successive winters. The results were most satisfactory, especially as regards broodiness. This factor was practically eliminated by the introduction of the non-broody white Leghorn strain. Egg production and size of egg were remarkable.

In 1928-29, we further experimented with crossing our half Busra by Leghorn pullets back to a pure White Leghorn male. We append the egg records which, though still good, were not quite so high as the first cross, but part of the results was lost by distributing the stock to a village, where no records could be kept. The appearance of this cross closely resembled the White Leghorn parent

The experiment was again repeated in 1929-30 and a third cross was made between the $\frac{3}{4}$ Busra X Leghorn pullets and a pure White Leghorn male of which the record is given. At the same time we continued to keep the Busra strain pure. In order to do this we imported a Busra or Bussorah cock from the Persian Gulf and mated him to our original hens. We have carefully recorded results, and the progeny due doubtless to the influence of the pure Busra male of whose parentage we had no record. Seven of the pullets of this mating were sent in 1929 to the National Laying Test, Milford, England, where they were in competition with some 3 to 4 thousand pure pedigreed birds from all countries. The results of their laying for 48 weeks are given at the end of this article. Breeders in the west have been immensely interested in their performance and in their wonderful vitality and stamina. In spite of snow and rain, not one bird has been sick or sorry. Their curious propensity to go broody at intervals for

a few days only and then return to lay has been the factor that has marred their otherwise fine performance. This propensity is only a matter of experiment to breed out. The interesting fact is, that this untried unpedigreed breed from India has put up in Europe, a very fine record, especially hens numbered 457 and 461. The former, by one egg only, failed to get the copper ring award, the hall mark of a recognized high producer.

In the field, that is to say in our distribution of eggs and birds to U. P. villages, the Busra X Leghorn cross has given satisfaction, and we are getting a great demand for all the stock that we can produce.

We hope to continue to breed these birds and would recommend all poultry breeding centres to indent on us for eggs and so procure a large supply of these fowls making them available to the smaller poultry breeders throughout India. Concerted action ought to be taken to raise large supplies of such a useful variety.

NOTE :—Wo have been placing pure Busra and first crosses between Busra hens and white Leghorn cocks into our villages with exeellent resultss. We have not yet distributed other crosses as they are still in the experimental stage of testing. Eggs of second crosses will go out to villages this year for hatching purposes.

Table 1.

Record of 7 Busra Hens sent to the National Egg Laying Test, England.

(*The Test record is for* 336 *days of lunar months, i. e.* 48 *weeks.*)

Serial No,	Regd. No. of hen.	Total eggs laid.	1st grade.	2nd grade.
1	45[illegible]	143	77	66
2	457	173	124	49
3	458	157	34	123
4	459	78	1	77
5	460	141	104	37
6	461	179	170	9
7	461	169	97	72

The average egg production per hen is 148-4.

Table 2.

Four years' winter record of pure Busra hens.

Year.	Number of hens in pen.	Eggs laid per month.				Total.	Average per bird.	Remarks.
		Nov.	Dec.	Jan.	Feb.			
1926-7	4	..	60	89	80	229	57-1	One hen was accidentally killed during 1921.
1927-8	4	27	61	59	76	223	55-3	
1928-9	3	52	33	54	24	163	54-1	
1929-30	3	9	24	16	44	98	32-2	The hens are now 5 years old and still laying.

Table 3.

Three years' winter record of first cross.

($\frac{1}{2}$ *bred Leghorn. Busra* × *White Leghorn cock.*)

Year	Numher hens in pen.	Eggs laid per month.				Total	Average per bird	Remarks.
		Nov.	Dec.	Jan.	Feb.			
1927-8	7	85	151	156	137	529	75.4	
1928-9	9	151	135	146	141	574	63.7	
1929-30	8	60	126	130	120	436	54.4	One death.

Table 4.

(Two years' winter record of second cross.

($\frac{3}{4}$ *bred Leghorn Busra. Busra* × *White Leghorn male mated to a white Leghorn male.*)

Year.	Number of hens in pen.	Eggs laid per month				Total	Average per bird.	Remarks.
		Nov.	Dec.	Jan.	Feb.			
1928-9	14	227	252	..	..	479	68.6	The hens were sent to a village and their records lost to the farm. (The average is calculated on a two months' basis.
1929-30	5	65	78	75	65	283	56.3	

Table 5.

Four months' winter record of third Cross.

($\frac{3}{4}$ *bred Leghorn Busra. Female progeny from mating Busra* × *White Leghorn* × *White Leghorn to a White Leghorn male.*)

Year.	Number of nens in pen.	Eggs laid per month.				Total.	Average per bird.	Remarks
		Nov.	Dec.	Jan.	Feb.			
1929-39	8	89	152	160	151	552	69	..

Table 5.

One year laying record of First Cross at the U. P A. egg laying test.

(*From* 1*st November*, 1927 *to* 30*th September*, 1928 *i.e.* 12 *lunar months*)

Register number of hen.	Number of eggs laid per month.											Total	Grade of egg.		Remarks.
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.		1	11	
Hen 44	6	17	24	22	21	14	6	12	8	11	9	150	45	105	
,, 45	9	24	25	22	25	12	3	13	17	3	9	162	47	115	
,, 46	17	25	23	20	18	17	6	6	13	13	5	163	39	124	
,, 47	14	25	23	21	22	16	10	12	18	8	14	183	64	119	
,, 48	19	23	23	20	21	19	5	13	17	13	7	180	55	125	
,, 49	6	17	17	15	17	9	6	5	16	6	5	119	35	64	
,, 50	14	20	21	18	22	11	9	9	10	5	nil	139	28	111	

SOME OBSERVATIONS ON THE TERMITES OF DEHRA DUN.

ALLEN P. K. SIRCAR, L. AG.

Termites or white ants, as they are commonly called, are very abundant in this district. It is a pity that the latter name has been assigned to them since they are on no account a close relation of the common ant and are entirely different insects. The only explanation to this can be found in the following few points of similarity :—

(*a*) The development of the social instinct to a marked degree in both these insects.

(*b*) The presence of specialized, apterous, sterile individuals known as workers and soldiers in their colonies.

(*c*) The swarming of sexually mature winged individuals from the nests at different times of the year.

While the above are the points of similarity, the dissimilarities may be enumerated as follows :—

Ants have wings with light veins while in Termites the veins on the wings are very prominent. The ant emerges as a helpless grub from the egg, while the Termites are, from the beginning, active and not unlike adults. Ants have a complete metamorphosis while in Termites it is either slight or absent. Ants are herbivorous carnivorous and predacious on other insects whenever they get a chance, Termites are herbivorous, fungicolous though canibalism is practiced to dispose off the dead, sick and the weak.

Social life is well developed in Termites. They live in big colonies in nests technically known as Termitaria, the structure of the nest being modified according to the habits of the different species.

Looking to the different phases of life in a community the various duties of a termitaria are well distributed between the different members of the colony. This division of labour leads to distinct caste system, and it is interesting to note that the morphological and physiological structure of the members of the different castes is so modified as to adapt them to the exact nature of work that they are intended for. Thus in all colonies unearthed in the Dehra Dun district six distinct types were found each differing from the other in the structure and development of the body and the mode of life led. The following is a short description of the different castes.

The 'Workers' derive their name from the fact that they are the labourers of the community, being engaged in foraging for food, tending and feeding the young and the royal pair, excavating and building the nest. They are readily recognized by their small size, veritically carried head and small jaws. The life of the community rests with them.

The soldiers get their name from the fact that they act as defenders of the colony. They accompany the foraging parties as guard and run out to repel any attack on the nest. They attack by either grasping or atleast threatening the intruder with their jaws, which are large and massive, curved and pointed, sometimes toothed and carried horizontally in front of the head. The head and jaws put together are equal to the rest of the body in length. They are covered with a thick layer of chiten.

The sexually mature termites are most familiar as the winged forms which swarm out of their nests generally during the onset of the monsoon. This flight is known as the nuptial flight. The insects that quit their parent colony in a swarm are found to be of both the sexes and may be seen to pair off in couples, running in single file in search of a convenient chink or hole to hide in. As soon as couples pair off, and sometimes earlier, the wings are thrown of by an apparantly voluntary muscular action. The wings are broken transversely near the base. Birds, frogs, ants and other other predacious insects of all sorts devour the winged Termites in great numbers as they issue from the nest, and very few escape being killed and eaten. A few pairs that escape burrow into the ground or trees, according to the species, and excavate a small chamber in which they lay eggs, which in course of a short time develop into soldiers and workers. It is interesting to note that the first batch of workers

and soldiers is tended by the royal pair when a new colony is started. after this the whole termitarium is managed by the workers that are thus got up. The colony thus goes on increasing till there are enough workers to go out in search of food and soldiers to guard the colony.

The original foundress, in the meantime grows larger and larger, until her body becomes as long and large as a human finger. It is known as the queen and its husband as the king. The queen is a helpless individual whose sole function is to produce eggs. She is located in a large chamber which is known as the royal cell. The king's presence is required to provide for fertilized eggs, but it scarcely increases in size beyond that attained at the time of the nuptial flight.

In all nests excavated in the Doon valley only a single pair of sexually mature adults have been found and as Indian Termites do not rear neotenic forms it can safely bo assumed that the royal pair once removed from a termitarium can never be replaced, and a colony once deprived of its royal pair will ultimately perish. This fact can easily be made use of by those who are interested in the eradication of the pest.

Termites occur in this district in almost all places where there is plenty of organic matter for them to eat. Low-lying forests are their favourite resorts, here their damage is generally extended to all forest products. Cutivated, as well as bare fields, are not lost sight of on account of the presence of decaying leaves, stubbles etc. Grass land, which covers a very big area in this district is in most places affected by them. Orchards have the same luck as the forests though the extent of the ravages of these insects is kept down by constant cultivation and avoiding crowding, still a large number of leechi and mango grafts and sometimes older fruit trees are destroyed by them every year.

The worst attack of Termites is on buildings, once they get in it is impossible to eradicate them. Poles, beams, doors, windows, floors, roofings, furniture are easily detected and easily destroyed. Termites seem to attack in places where moisture is easily procurable, and Dehra Dun being a moist place with a high water level and extensive forests all round offers very favourable conditions for their existence.

I collected the following species from the Doon Valley, a study of their habitat will give one a fair knowledge of the nature of the attack of each species :—

1. Odontotermes obesus (*forma typica*) :—dug out of conical mounds. The mounds reach a height of about four feet, and have a fungus garden at the base, generally some distance from the surface of the soil. They are mostly found on high levels or slopes. These Termites are almost wholly fungicolous, though

they seem to attack wood but to a very slight extent being negligible from an economical standpoint. I had eleven mounds of this species dug out; the localities being Kaulagurh Tea State, Forest Research Institute compound, Banjara Tea State, Raipore and a few orchards within the municipal limits of the city.

2. *Odontotermes feăe*:— was found attacking deal-wood packing cases in a godown; the contents being mostly cotton were badly damaged. Both workers and soldiers were present, the rest of the nest could not be worked out as the tunnels ran through the pucca floor into the ground below. These termites were also detected in the timber testing graveyard of the Forest Research Institute but never in large numbers. They are entirely wood-eating insects.

3. *Microtermes*:— collected from under logs and from under bark in several places. A log lying on the ground was found to be badly infested by them on the Chakrata Road, eight miles out of Dehra Dun. Workers and soldiers were present in large numbers. Attempts were made to follow the tunnels and locate the main nest but it was found impossible on account of the fragile nature of the soil.

4. *Odontotermes obesus* (VAR. OCULENTUS):—were dug out from multilocular mounds in the different parts of the Doon. It is distinguished from the species O. obesus in building a different shaped mound. The colour of the mound too in most cases was more inclined to be red, while that of the latter were yellowish. The winged adults could not be procured. There economical importance is the same as that of O. obesus.

5. *Leucotermes indicola* :—were found at the bottom of a pole; the upper portion was covered with the earthen galleries of these insects. The soft wood had been eaten away, and the annual rings were left unattacked, resulting in parallel grooves. The knots in the pole were also spared. This termite is essentially wood-eating.

6. *Eutermes monocerous* :—I dug out these from manure heaps, from orchards, private farms and the cultivator's field from several places in this district. They are totally harmless termites and live in rubbish. Further information on these will be of no avail.

It is important to note that control methods on any pests cannot be carried out successfully unless the life history is well known to the aspirant, and since the life-history of the Indian termite is so imperfectly known it is of primary importance to first become well acquainted with the harmful species and then start to use different methods of control. This is the reason why it is suggested to always solicit expert advice on this subject.

A further article on the 'Biological Survey of the Indian Termite' will appear in the next issue of "THE FARMER."

NEED OF REORGANISATION IN INDIAN AGRICULTURE.

MASON VAUGH.

Indian agriculture is faced with the necessity of reorganising to an extent which very few even of the experts in agriculture and economics realise. Here agriculture is a survival of the old subsistance type of farming which has very largely passed out of existence in most of the more newly settled countries and which is rapidly passing elsewhere. It is still based on each family producing almost everything consumed by it except possibly salt and one or two minor condiments. It has not yet been organised to compete in world markets.

The old village organisation was designed to meet co-operatively the entire need of the community, and the only surplus of products the farmer needed to plan for was the contribution he made annually to the support of the village menials and craftsmen. Little need for money was felt as products were exchanged directly and they for the most part only locally. This situation has changed. More or less suddenly, the Indian village has become the neighbor of New York, Liverpool and London, Manchester and Chicago, Berlin and Tokiyo. As they are easily available, the Indian villager now wants things he knew not of a few years ago. More and better clothing, journeys on the railroad, looking glasses and lanterns, an engine-driven flour-mill to grind his grain easily and quickly, and many other things not known a few years ago are now daily necessities.

It will do no good to deplore this change and to lament that the villager was happier as he was. The change has come before we realised that it was to come at all. We might as well attempt to stop the flow of the Ganges with a dam at Tribeni as to stop this change. We can guide and train the flow of the Ganges into a channel we select and we can utilise it to carry our products and serve us in many ways but we cannot stop its flow. So with this change that is coming over India—far better to try to understand it and guide it into useful channels than to sit and wring our hands in despair or try to stop it.

It will help us to understand what is happening if we review a little history. The change started when the steam engine was first brought into use. The steam pump made coal more available. Cheap coal plus the steam engine produced the industrial revolution. The railway and the steam-ship followed very soon after. These things gave us power to use in manufacture and methods of getting products from place to place but there were few men to utilise them. Most of the people, probably 80% or more, were occupied in the task of providing food.

Then another change began. Availability of power stimulated the production and utilisation of steel and iron, which began to be applied to agriculture. The steel plow became effective in the decade 1830-1840. Within a very few years, the mower for cutting hay, the reaper for harvesting grain and the animal drawn cultivator, tremendously increased the capacity of man to provide food for himself and for his animals. About the same time the power thresher came into use. All these things so tremendously increased the ability to produce food that the number of men required to feed the whole community greatly decreased. This change largely took place first in the United States of America. Its full development was delayed by the Civil war. Directly after the war, the use of these new machines led to such a development of agriculture as to cause a prolonged depression in prices of food. Agriculture became unprofitable because each farmer could produce so much more than he needed for himself and since everyone else was doing the same, no one could profitably sell his surplus. During this time maize on the cob was actually used as fuel to cook food and heat the home of farmers because it was cheaper than other fuel. This drove many people from agriculture to seek work in the cities as laborers. People with energy and initiative, seeing no profit in agriculture, turned to manufacture.

The end of the last century and the beginning of the present saw a tremendous development of industry and manufacture which drew large number from the farms into the cities, reducing the numbers of people producing food and increasing those consuming the farmer's surplus. This led to several results. Where before fine clothing, furniture, travel and the comforts and conveniences of life had been available to few, increased production now made them available to the many and the standard of living rose as it had never risen before. Because of increased production what had been the luxuries of the rich before became available to all who would exert themselves a bit, in America at least, and to a less extent in England and Europe. All this made a market for agricultural products and again made farming profitable. Seeing the results of utilising power in industry, attempts began to be made to apply power to agriculture as well. The steam traction engine, for many years used to drive the threshing machine and other portable belt driven machines was used with indifferent success for plowing. The lighter and more powerful internal combustion engine was developed and applied first to stationery uses, then to the automobile and later to the farm tractor. Then the world war came on, intensifying the demand for agricultural products.

This intensified demand has resulted in the perfection of the tractor, in the introduction and improvement to a state of practicability of the combined harvester-thresher, in the wide adoption of improved methods of cultivation of row-crops. Methods and machinery for handling many phases of agricultural work nave been revolutionized. These improved methods and machines have resulted in the utilisation of tremendous areas of semi-arid land not formerly available to agriculture but admirably adapted to the new methods and making possible the production of wheat and cott n at a cost previously thought impossible. The motor car, the bus and the truck or lorry have practically replaced the horse in western countries for road use as the tractor is rapidly replacing it in the fields. The motor car, bus and lorry are already coming very definitely into the picture in India.

But, you ask, how does all this happening in America, Australia, South America and Russia, have anything to do with conditions in India? In former times, it had no meaning but now with modern steam and motor ships, wheat can be put into Calcutta from Australia at a lower cost by steamer than it can be brought from the upper Punjab by rail. I am speaking of actual costs and not rates due to subsidy or control. Two years ago when Indian wheat was insufficient to meen the demand and the price higher than world market rates, Australian wheat was sold in Allahabad for less than locally grown wheat. India is no longer isolated by oceans and mountains. She can if she wishes, choose to forego for some time, the advantages of the modern methods in use elsewhere but the only way she can compete with the rest of the world is by using comparable methods. I see no reason whatever, why India cannot have as high a standard of living for her people as any country in the world but the only way she can get it is by making it. The standard of living in the end is determined by the collective production of the people and the present standard of living in India is low because the average production is low. We can have more shoes, dhoties, wheat and ghee only when there is more of things available.

Much of our thinking on these matters has been obscured by the concept of price. We think in terms of price rather than in terms of cost. In reality, price is determined by cost. To a large extent, we have control of our costs, while the other fellow's costs sets our price for us. As long as the price is more than our cost, we make a profit. Therefore the important thing is for us to try to reduce our costs rather than to worry about prices. No successful method of controlling prices by law has yet been devised. If the price fixed is less than the cost of production, we simply quit producing. If the price is fixed artificially high, we find a substitute. And we should remember that it is the low cost pro-

ducer who sets the price. It is claimed now that modern methods will give a profit on wheat at Re. 1-14-0 per maund. Compare that with the price this year in the Indian market and with costs of producing wheat in India.

Finally, what can we do about it ? There are three answers—produce more, reduce production costs, or utilise what we produce more wisely; and of the three perhaps the greatest is the reduction of costs.

To comment on the last answer first, the Indian farmer must learn to use more of his surplus for further production. The present flow of gold and silver into ornaments and buried hoards must be diverted to working capital. If this were done through co-operative banks, the plea of lack of capital for purchase of productive implements would disappear. The present tremendous burden of the idle but able-bodied men in India must be removed from the shoulders of the farmer and utilised. The tremendous number of unproductive cattle must be partly replaced with highly productive animals and partly eliminated by breeding control and possibly by other measures. The appalling drain due to inefficient housing of man, animals and farm products in poorly planned buildings having a tremendously high upkeep must be stopped.

The question of how to produce more involves several phases. Increased production per man in agriculture will set free man power for other industries. In order to have the wide variety of products which makes a modern standard of living possible, we must either produce them with men now largely in agricultural work or we must produce agricultural products cheaply enough to be able to undersell the world market and buy them with the proceeds. The first seems desirable. It should be understood that the most pressing need today is not more food production but cheaper production so that the millions now hungry can have access to the apparent surplus now available. Greater production of food per man, with a large proportion of the man-power of the country devoted to other work will effect this. The things which will make possible this greater production per man are varied. Undoubtedly, the whole question of land tenure is a very important phase of it. Increase of the area cultivated per worker would help and this will be possible when fewer workers are engaged on the land. Large additional areas can be secured by reclamation, utilisation of land now devoted to grazing unproductive cattle and by the extension of irrigation facilities. Perhaps of equal importance with the increase in production per worker, will be the increase in production per acre. Toward this, every increase in our knowledge of cultivation, manuring and the control of other factors affecting yield will contribute. Possibly the most urgent problem of all and the problem toward the solution of which

we have made the least progress is the application of power to agriculture. This is the thing that has changed world conditions and which must change conditions in India. Unfortunately, climate, crops and the habits of the people are such that the wholesale importation of foreign methods and machines is not feasible. The problem of developing efficient sources of power and machines to apply the power to agriculture is the most urgent need of Indian agriculture today. The question of reducing costs and increasing productions are interwoven and very largely the one involves the other. The utilisation of better equipment will do more than all other factors combined to decrease costs.

Summary :—The application of power to agriculture through improved machinery has resulted in profound agricultural depressions in the past and is the ultimate cause of the present depression. The present depression of prices is probably approximatly permanent and must be met by reduction in costs. This reduction in cost can only be secured by increasing production per worker by the use of improved machinery. This must be accompanied by increased production in non-agricultural lines by the utilisation of men not required for agriculture in other lines.

FEEDING OF CHILDREN.

INSTRUCTIONS TO PARENTS.

The Jumna Dispensaries, Allahabad.

YOUR CHILD IS SICKLY CHIEFLY BECAUSE YOU HAVE NOT FED AND CARED FOR IT PROPERLY. Put into practice today those of the following instructions which apply to your child in its present condition :—

DIARRHOEA.—If the child has diarrhoea it means that you have made some mistake in its feeding. The commonest mistakes are:—irregular meal times, eating between meals, giving highly seasoned and coarse foods which are unsuited to the delicate stomach and intestines of the child between the ages of one and five years.

THE TREATMENT OF ABDOMINAL TROUBLES IN CHILDREN IS NOT AS MUCH A MATTER OF MEDICINES AS IT IS OF CORRECT FEEDING.

First Day.—At the dispensary the child is given a dose of castor oil. Stop all nourishment. For 24 hours give it no milk or food of any kind. Instead, give plenty of cool, boiled water offering the child a chatack or more at least every hour. In addition, weak tea may be given, a half-pao with a little sugar

in it every two or three hours. Have the child rest as much as possible.

Second Day.—Give the child a half-pao of skim milk every 4 hours. Between feedings continue the water and weak tea as on the previous day. Also administer the contents of one paper, four times a day, after feeding, mixing the powder in a tablespoonful of water or skim milk.

Third Day.—If there is definite improvement in the diarrhoea increase each feeding, giving a mixture of 2 chatacks of whole milk and one chatack of boiled water, four times in the day—6, 10, 2, and 6. Continue the water and powders as on the previous day. Stop the weak tea.

Fourth Day.—Continue the powders and feeding as on the previous day, and report at the dispensary.

Unless otherwise instructed, on subsequent days gradually increase the quantity of milk to 1 pao of whole milk four times a day: and gradually add thin arrowroot, sago or suji to one or two of the feedings. When the stools are quite normal and the child feeling perfectly well, gradually institute the diet given below.

GENERAL RULES:—*Between the ages of one year and five years one seer of milk a day is the basis of a child's diet.* It is impossible to raise healthy children without that amount being given regularly. Cow's, buffaloe's and goat's milk is all about equally good. In addition, during the course of the second year gradually add dal and meat soups, dahi, sago, arrowroot, suji, samain, eggs: later, a little unseasoned meat, loaf bread, biscuits and butter: later, dal, maida chapatis, boiled, unseasoned vegetables and stewed fruits, all in small amounts.

BAJRA, JAWAR, CHANA, COARSE CHAPATIS, HIGHLY SEASONED FOODS AND RICH FRIED FOODS, SUCH AS PURIS, PARATHAS AND HALWA WERE NEVER MEANT FOR SMALL CHILDREN.

Institute a regular routine for the child. The following may be used as a guide:—

6 A. M.—A pao of milk; 2 suji or maida biscuits, or 2 slices of bread with butter.

10 A. M. —Suji, arrowroot or sago, simply cooked in a little water of milk, and eaten with milk and a little sugar. A small portion of meat, vegetables or egg (boiled). Fruit juice.

11-45. —A cool bath daily, all the year round.

12 to 2 —A nap.

2. P. M.—Rice, dal, bread, butter and milk.

6. P. M.—A pao of milk; dahi, suji or arrowroot: stewed fruit.

7. P. M.—To bed.

The lightest clothing should be worn all the time, except on winter, mornings and evenings, when a warm coat is necessary. Use a mosquito net and have the child sleep outside all the year round.

NOTES ON BEE-KEEPING INDUSTRY

MR. JAYAKARAN, Y. M. C. A. RECONSTRUCTION CENTRE, COIMBATORE.

The are four kinds of clustering bees in India—

(1) The Rock Bee.
(2) The Indian Bee.
(3) The Little Bee.
(4) The Dammar Bee.

The Rock Bee.—The Indian Rock Bee is the largest honey gatherer in the world. But all attempts at its domestication have so far proved unsuccessful and perhaps this bee must be left to continue in the jungle for ever. Its sting is very poisonous. Most of the bazar honey sold in India is the produce of this giant bee of India and therefore some training given to valayars, who are our professional honey men, in the humane methods of dealing with this bee and collecting its produce in a pure state fit for human consumption without destroying the possiblities of further honey stores by the colonies dealt with, is bound to increase the honey output of our forests. Our attention, however is at present given to the Indian Bee, known to Science as Apis Indica.

The Little Bee.—This is an open air comb builder like the Rock Bee and being small is not a gatherer of plentiful stores. The most that can be got out of its single comb at a time being not more than a few ounces of honey. A colony can easily be made to stay in the place to which it is transferred with the branch of the tree or shrub to which it clings, but only till the honey is removed by its owner. The very first extraction induces the bees to desert the place. This bee also has thwarted the efforts of man to domesticate it.

The Dammar Bee.—This is a very tiny insect and consents to live under domestication, but its honey collection is so poor that no commercialization of it is possible.

The Indian Bee.—This is the only variety which can be hived for honey production on our farms. Unlike the Rock Bee and the little bee, it builds a number of combs, side by side, not in the open air but in hollow cavities of trees, pots or boxes and in the recesses of walls. As many as seven combs have been found in one cavity, the shape and size of the combs depending upon the shape and size of the cavities. The Indian Bee is capable of stinging though not so badly as the Rock Bee—but with proper handling and treatment can be trained to abstain from hurting its owner in this way.

Increased yields of honey in domesticated colonies.—It must be remembered that all bees gather honey in their combs for their food in the winter months when they cannot fly out and forage. There is no honey flow in the fields during the cold months either. The European bee, which is world renowned for large collections of honey, must needs be a great gatherer because it has to pass through about nine months of slack season, whereas its Indian sisters, which have hardly any such prolonged season, have no need for storing large supplies. During the honey flow season, which is the summer season, the bees take the earliest opportunity to store honey in the combs and merely work out in the fields for their daily bread during the rest of the season, falling back on their stores during the cold season only, so that if from a domesticated colony of bees, the first store is removed, the bees will start storing again and will do so everytime their store is lost, provided, of course, such losses occur within the honey flow season leaving a margin in that season for the bees to collect finally. A thorough knowledge on the part of the bee-keeper of the possibilities of the season every year becomes therefore very essential.

The protection against enemies and the proper housing afforded to bees in domestication, coupled with the help given by the bee-keeper to conserve the temperature of the hives by regulating accommodation and to increase their population by swarm prevention operations, must naturally result in larger productions. A domesticated colony therefore ought to and does produce a lot more honey than a colony in nature.

Our experience.—In a favourable season, a crop of twenty pounds can be had from each hive. For this was the collection made by us in 1929 which was a year which was below average in respect of rainfall. At each extraction 2 lb. or a little less was the result, the frequency of this operation depending, of course, on the quality of honey flow available in the fields. May-July is usually the period of heavy flow.

We had six hives in 1929. Only three of them were strong and paid over Rs. 60. There are at present 30 strong colonies

and the total income from them will be known by the end of August this year. I am receiving very good reports about the quantities of honey they give. Judging from these reports, I have reason to believe that 20 lbs. from each hive will be possible this year also.

Wax, a bye-product to the value of 8 annas, can be had from each hive in a year, not to speak of the helpfulness to field crops and fruit trees of the proximity of an apiary. Since introducing bee-keeping we have had better results from our own fruit trees and our neighbours have benefited too. In fact, bee-keeping has several advantages over poultry-keeping and gardening. In the first place, very little initial expense is required for starting with bees, there is practically no feeding expense, an apiary does not demand daily attention, does not occupy a large space and the produce, *viz.*, honey, can directly be taken to the table without any need for cooking. It is A-1 food.

Should bees be purchased?—No. There are innumerable colonies of the Indian Bee almost everywhere in India. Even in the most unlikely places they are found to thrive. How to catch them and hive them in a modern frame hive is all that has to be learnt by any one who wants to make a start. No money need be spent in buying bees. The hive can be made even by a village carpenter and does not cost more than Rs. 5. The methods of hiving, since they are all commonsense methods, can be mastered by anyone, say, within a week. Only if the newly caught colony is not up to the mark in respect of population a little artificial feeding (sugar syrup) may have to be done. Otherwise, no need for this. In Ramanathapuram we use plantain fibre instead of steel wire for binding combs, with better results. No smoker need be employed to subjugate bees in the warm climate of India. For bee brush we use large feathers. For ant-preventors cocoanut shells are used. We have not yet thought out anything to take the place of the honey extractor which costs about Rs. 15-0-0. It must be remembered, this is not an annual or recurring charge. It is our hope that the village butter churn, with some sort of holder for the combs attached to it, might supersede this extractor in the villages.

How to get the best result.—Selection, knowledge, work, means success in bee-keeping. To get the best results, therefore, a first-rate training must be taken. To be an all-round bee-keeper not only such a training, which should in length correspond to a full honey flow season, is necessary but also the application of the knowledge thus gained with as much industry as that of the bee itself. Six months—April to September—may be quite sufficient for a thorough training. Over 80 men have been trained by us for varying periods and several of them do make a success of their apiaries.

How many hives can be kept in one locality?—The number of hives for a given locality will depend upon the pasturage available for the bees kept. We would therefore suggest that six hives may be located in a place, to start with, and, as its possibilities become known, more may be added. We have nearly 32 hives in Ramanathapuram, large and small, all told, and know that there is still room for more hives judging from the collections.

Can bee-keeping be a full-time occupation?—We cannot answer this question yet. But we are sure that it is a very profitable subsidiary industry, because we have tried it only on this scale with success. In a few years more we shall be in a position to answer the above question one way or the other satisfactorily.

Is there a market for honey?—Enormous demand exists for pure honey, as evidenced by the innumerable prepaid orders we receive long before the honey season. Recently at the suggestion Mr. Bazlullah Sahib, late Director of Industries, we put up the price from Re. 1 per pound to Re. 1-4-0 per pound. The demand has increased in spite of this.

Who can keep bees?—Everyone who has a head and hands, including old women. It is easy work.

An Estimate for a Six-hive Apiary for One Year.

Receipts.	Rs.	a.	p	Expenses.	Rs.	a.	p.
60 lb. extracted honey at Re. 1 a pound	60	0	0	6 hives with body box, super-frames, bottom board and roof complete ..	30	0	0
Wax collections	2	0	0	1 Honey Extractor ..	15	0	0
Increase in number of colonies (6 swarms) at Rs. 2 each ..	12	0	0	Sugar Syrup ..	1	0	0
				Feeder (an ordinary cigarette tin) ..	0	0	6
				An uncapping knife for use on combs in extraction	1	0	0
					47	0	6
				Profit ..	26	15	6
Total ..	74	0	0	Total ..	74	0	0

NOTE.—1. The colonies have paid for their hives and extractor in one year.

2. The extractor cannot be a charge any more.

3. Sugar syrup is only necessary if there are weak colonies.

4. Liberal provision is made for expenses.

5. A very conservative estimate has been made for receipts.

BIRTH CONTROL.

DR. M. S. HAYES.

In a recent article on Birth Control, published in the Journal of the Christian Medical Association of India, Dr. Sherwood Eddy says, "Of all the questions that challenge us to-day perhaps none are so delicate and difficult, probably none strike so deep into the heart of human happiness and misery, none are so steeped in ignorance and blindness, as are the problems of sex." If this is true of the problems of humanity in general it is certainly true of the villages of India.

Waste of human life and energy means failure to apply that life and energy to some constructive and uplifting purpose. Ignorance of the governing principles of life inevitably means waste.

At the present time knowledge of birth control principal is largely of two kinds: first the technical discussions for the medical profession in publications largely limited in circulation to physicians; second, books and pamphlets put out and advertised by practitioners who would profit by the sale of various appliances and medicaments. The latter is usually accompanied in an advertisement with guaranteed cure for gonorrhea and syphilis. It has therefore the disadvantage of association with what in many cases proves to be quackery.

Dr. Eddy further says, "Our attitude cannot be determined by the prejudice of obscurantism that has been involved against all innovations in the past. Rather we must find a deeper and truer interpretation of life in harmony with nature.

Like every other discovery of man, scientific contraception can be misused; it undoubtedly is misused in many cases, as every other privilege of human life is. But it is also being legitimately and successfully used quite widely. Instead of the ignorant and often dangerous practices at present in use by some, we believe they should have access to the safe and scientific methods now available. Whether either ignorant or scientific, birth control has come to stay. We can no more stop it than we can turn back the tides or eradicate sex from human life. Our choice is between ignorant malpractice and intelligent control. Without approving of its abuses we deliberately approve of its proper use. We are not advocating the giving of this information to unmarried young people. We believe that all married people who desire it are entitled to this information. The refusal to supply contraceptive information means inevitably sickness and death for thousands of mothers and children. For others it will result in the wrong means with serious consequences, and will sometimes eventuate in unhappy marriage and broken homes.

We would encourage therefore any effort (1) to inform the people that there are scientific safe methods of birth control, and (2) to make these means available to those who desire and need them. The need can best be decided after consultation with a physician, as any other physical disease or need should be met.

PRINCIPAL'S PAGE.

Allahabad for some weeks was the centre of interest for those interested in the political development of India. Mr. Gandhi came here directly he was released from jail. We saw him as he arrived at Chheoki, met by Pandit and Mrs. Jawaharlal Nehru (also just released) and many other prominent Indian leaders. A few days later, with Dr. Hutchins of Berea, Kentucky, we had a brief, friendly interview with Mr. Gandhi.

The Institute has had visits from the Commission on Higher Christian Education and several members of the American Laymen's Fact Finding Commission. These distinguished guests while noting our incompleteness greatly encouraged us by the things they said of the way the Institute is seeking through sound and proper educational methods to meet the needs of rural India.

We are so conscious of our shortcomings, our shortness of staff and equipment, that it came as a surprise that such capable men should speak so well of our efforts. Their attitude enheartens us and gives us renewed zeal for our task. Many are the opportunitiies that come to us which we have to refuse to accept because of inadequate staff and equipment. We are using every proper means to increase our usefulness to India as a servant of India and of the Lord Jesus. He laid down the principle that he who would be great must be a servant of all. This greatness through loving service to the neediest of India's folk is the greatest ambition of the Institute. The Institute is seeking to serve in definite, practical ways that the common folk can understand. It is therefore organizing a brief short course for those interested in Rural improvement, Rural Preachers and Teachers. Also for neighbouring farmers, so many of whom come and look round the farm, cattle yard and dairy, and ask for help. This latter is modelled on the "Farmer's Week" so helpful and practical to the farmers of the United States.

As power farming, whenever possible, greatly reduces the costs of production and thus increases the likelihood of profits, the Institute is offering a two months' special course to trained agriculturalists. This was the first institution in India to offer such a course.

The leaders of India are deeply concerned, and righly so, at the large amount of unemployment among Indian graduates. The Institute believes that every graduate of an Indian Agricultural College can make a good living if he will put into practice what he has learned, either on his own land or on rented land. Further, such a man using better seed and methods will be as a light shining in a dark place. His less privileged neighhours seeing his good works will copy him. Thus he will help not only himself but his country, the aim of every true patriot.

SAM HIGGINBOTTOM,
Principal.

OFFER OF A PRIZE OF RS. 3,500

For an Improved Bone-Crusher.

A communique issued by the U. P. Government states :—

The Imperial Council of Agricultural Research offers a prize of Rs. 3,500 for the design of an improved bone-crusher to be driven by a small engine and suitable for the production of finely-ground bone meal for manurial purposes. Competitors should submit detailed scale drawings which must be sufficiently complete in all details to enable a manfacturer to make the crusher.

To be eligible for the prize a design must comply with the following conditions:—

(1) The design must be a material advance over any pattern of bone-crusher at present on the market.

(2) The crusher should be capable of being worked to its full capacity by an oil-engine of 12 to 15 B. H. P. or a similar prime mover.

(3) Cheapness, durability and simplicity of adjustment are essential and no design not satisfying these conditions will be eligible for the prize.

(4) The successful competitor will be required to give an undertaking to give licenses for the manufacture of his design in India at a royalty not exceeding 10 per cent. of the cost of manufacture.

Drawings must be submitted to the Secretary, Imperial Council of Agricultural Research, not later than 1st November, 1931.

Drawings will be examined by experts appointed by the Imperial Council of Agricultural Research and one or more designs may be chosen from which the actual crushers will be constructed for test purposes.

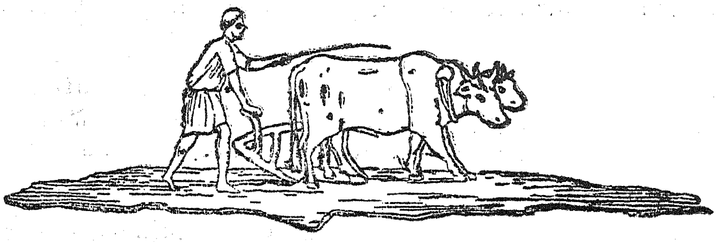
Any competitor may be required to manufacture a crusher or any parts thereof, according to his drawings.

The cost of such manufacture would be borne by the Council up to a limit of Rs. 500 each including delivery and erection at the station chosen for tests.

The prize is open to all irrespective of caste, creed or nationality and Government servants are eligible to compete for it subject to the consent of the Government under whom they are employed. The Council reserves the right to withhold or postpone the award of the prize if no entry is of sufficient merit, or to divide the prize.

The award of the judges appointed by the Imperial Counci of Agricultural Research will be final and all entries will be accepted on this condition.

Forms of entry can be had on application the secretary, Imperial Council of Agricultural Research. Imperial Secretariat, South Block, New Delhi.



EDITORIAL

Quotations.

He who helps a child helps humanity with an immediateness which no other help given to human creatures in any other stage of human life can possibly give again.—PHILIPS BROOKS.

* * * * *

What then do you call your soul? What idea have you of it? You cannot of yourselves, without revelation, admit the existence within you of anything but a power unknown to you of feeling and thinking—VOLTAIRE.

* * * * *

Life is a fragment, a moment between two eternities, influenced by all that has preceded, and to influence all that follows. The only way to illumine it is by extent of view.—

WILLIAM ELLERY CHANNING.

* * * * *

Let us endeavour so to live that when we come to die the undertaker will be sorry.—MARK TWAIN.

* * * * *

There is no short-cut, no patent tram road to wisdom. After all the centuries of invention—the soul's path lies through the thorny wilderness which still must be trodden in solitude, with bleeding feet, with sobs for help, as it was trodden by them of old time.—GEORGE ELIOT.

* * * * *

Reading is to the mind what exercise is to the body as by the one health is preserved, strengthened and invigorated; by the other viture (which is the health of the mind) is kept alive, cherished and confirmed.—ADDISON.

Selfishness is not living as one wishes to live; it is asking others to live as one wishes to live, and unselfishness is letting other peoples' lives alone, not interfering with them. Selfishness always aims at creating around it an absolute uniformity of type Unselfishness recognizes infinite variety of type as a delightful thing, accepts it, acquiesces in it, enjoys it—OSCAR WILDE.

* * * * *

There is but one virtue: to help human beings to free and beautiful life; but one sin: to do them indifferent or cruel hurt; the love of humanity is the whole of morality. This is Goodness, this is Humanism, this is the Social Conscience.—J. WILLIAM LLOYD.

* * * * *

Give me the money that has been spent in war and I will clothe every man, women and child in an attire of which kings and queens would be proud. I will build a schoolhouse in every valley over the whole earth. I will crown every hillside with a place of worship consecrated to the gospel of peace.—

CHARLES SEEMAN.

* * * * *

Everyone now believes that there is in man an animating, ruling characteristic essence, or spirit, which is himself. This spirit, dull or bright, petty or grand, pure or foul, looks out of the eyes, sounds in the voice, and appears in the manners of each individual. It is what we call personality.—CHARLES W. ELIOT.

* * * * *

Happiness in this world, when it comes, comes incidentally. Make it the object of pursuit, and it leads us a wild-goose chase, and is never attained. Follow some other object, and very possibly we may find that we have caught happiness without dreaming of it; but likely enough it is gone the moment we say to ourselves, "Here it is! like the chest of gold that treasure-seeker's find.—NATHANIEL HAWTHORNE.

* * * * *

Knowledge is essential to conquest; only according to our ignorance are we helpless. Thought creates character. Character can dominate conditions. Will creates circumstances and environment.—ANNIE BESANT.

* * * * *

If I had my life to live over again, I would have made a rule to read some poetry and listen to some music at least once a week;

for perhaps the parts of my brain now atrophied would thus have been kept active through use. The loss of these tastes is a loss of happiness, and may possibly be injurious to the intellect, and more probably to the moral character, by enfeebling the emotional part of our nature.—DARWIN.

* * * * *

The victory of success is half worn when one gains the habit of work.—SARAH A. BOLTON.

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Commission on Higher Christian Education.

Allahabad has had recently a visit from the Commission on Higher Christian Education which has come out to India at the request of the National Christian Council, to consider the needs and prospects of missionary higher education in the country. The Commission, while in Allahabad, inspected the Agricultural Institute where it had a conference with the Board of Directors and staff of the Institute. It also visited the Ewing Christian College and Holland Hall and met its Board of Directors and staff. It is not possible to say as to what the recommendations of the Commission are likely to be, but the Christian institutions in India are hoping that it will be such as will enable them to carry on their work in a manner befitting their position. The Christian institutions are here to serve India and their earnest desire is to help in every way they can to raise the tone, moral, spiritual and economic condition of its citizens in the spirit of the teaching of Christ. It is obvious that they can not fulfil their purpose adequately unless sufficient funds and proper personnel are placed at their disposal. We can only pray that God may guide the Commission in its important task, and that it may be used by Him to further the cause of His Kingdom in this great country.

* * * * *

Course in Rural Knowledge.

The tendency to make rural education serve rural life has received both recognition and an impetus in the establishment of courses in agriculture and "rural knowledge" in rural middle schools in the United Provinces, and in the training of teachers for these subjects. The Institute is happy to have a part in this movement by conducting a training class. During this first year there have been in attendance more than fifty teachers from Government schools, as well as two from mission schools.

The Minister of Education has said that these teachers will have as their pupils not only the boys and girls in their schools but the whole village. They are expected to introduce better methods of farming, sanitation and all that makes for a more worthy village society. That they will be faced with a task of tremendous difficulty is obvious to all who know the peasant mind in this country or elsewhere. But the task is not impossible. We have the assurance of Mr. Malcolm Darling that the "new light" is spreading in the villages of the Punjab, and that it is finding acceptance. This is true also of the United Provinces.

In this training class we are trying to equip these teachers for the fight. This equipment we conceive of as a vision of what can be done; knowledge of simple improvements; ability to put their knowledge into action, which means both manual skill and an attitude of respect for labour; and determination to go ahead under even unfavourable conditions, and with inadequate equipment. Realizing that in village schools equipment will be scarce, that used in their training has been kept very simple, and they are being taught to make most of what they need. Mr. Vaugh calls his course one in ingenuity rather than in engineering—the words have a common Latin root.

It is expected that the course will be continued until there is a specially trained teacher in every rural school in the province. If, along with this there be supervisors of greater technical training, the contribution to rural life may exceed our dreams.

* * * * *

The Control of the Mentally Defective.

Dr. J. J. Pacheco, in writing for the Indian Association for Mental Hygiene, computes that the total defective population in India amounts to 2,560,000. Of this number he estimates that imbeciles and idiots and the most hopeless ones amount to 640,000. There is no institution to which they can be admitted for treatment. There are no institutions for training mental defective children. Mental defectives represent a social menace. There must be adequate legislation for their care and control. Institutional accommodation must be provided for those who are unfit for life in the general community. Facilities must be provided for general and occupational training according to their particular needs and capabilities.

* * * * *

Prohibition a benefit to agriculture in U. S. A.

The Eighteenth Amendment has been invaluable to agriculture because of the increased consumption of farm prodncts. We have time but for a single example. In 1917 our average per capita consumption of milk was 754,8 pounds. Ten years later

the per capita consumption was 967.3 pounds, indicating that milk was taking the place of beer throughout the land and that children were enjoying the health and life-giving materials with which the dairy cow—the foster mother of mankind—blesses society. To produce the increased milk consumed would require more grain than was used by all the brewers and all the distillers before prohibition. Agriculture has suffered serious depression, but prohibition has not been the cause. This depression would have been more grievous had wet conditions prevailed.

—THE AMERICAN ISSUE, SEPTEMBER, 1930.

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Sources of hazard loss and high production costs.

The place that weed research and control is taking in American Agricultural practice is very significant. It has been brought out that three great sources of hazard are *erosion of the soil*, *unfavourable climatic conditions*, and *the ravages of pests of crops and livestock.* The losses caused by erosion and run off have not been given anywhere near serious attention in this country. It is time that preventive measures were sought and applied on a large scale. Research cannot wholly counteract harmful climatic conditions, but research can conserve moisture by finding better tillage methods and more drought resistant crops

Agricultural pests may be separated into four groups: (*a*) animal disease, (*b*) plant diseases, (*c*) insects and (*d*) weeds. It has been estimated in the U. S. A., that the losses caused by animal diseases are only one-twelfth as much as the estimated losses from weeds. Plant diseases account for a loss equal to 13 per cent of the gross value of the leading crops. Insects cause a loss equal to one-third as much as that caused by weeds. Weeds thus cause an enormous loss annually by:—

1. Reducing the quantity and quality of crop products.
2. Harboring disease organisms, insects and worms which attack crops.
3. By increasing labor and equipment costs on the Farm.
4. By reducing the quanity and quality of livestock products.
5. By increasing commercial labor.
6. By causing depreciation of land values.

The weed is a costly pest.

* * * * *

Glass-Lined Dairy Equipment and its Advantages.

The most widely used material for Dairy Equipment is Tinned Copper, but as the Tin-coating quickly wears away, leaving a bare Copper surface, other metals have come into use, such Aluminium and Nickel.

All metals, however, dissolve to some extent in milk with resulting possible deterioration of the dairy product. Glass is, undoubtedly, the material best adapted for handling milk. It is more resistant to Lactic Acids than are any kind of metals, no off-flavours due to corrosion being imparted to the milk when glass is used.

Moreover, glass is quick and easy to clean, and as it presents a smooth surface organic material is easily removed. It also lends itself to simple forms of sterilization, thus ensuring the handling and storage of milk without any risk of contamination from metals or otherwise.

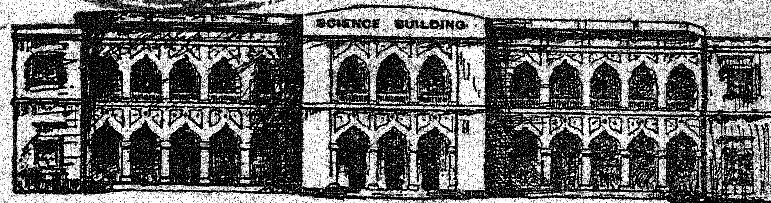
For Dairy purposes, the Pfaudler Company of Rochester, U. S. A., have designed Pasteurizers and Tanks of Glass-lined Steel, which can be used with equal efficiency for pasteurizing milk, cream, ice cream, ice cream mix, for aging ice cream mix, for cooling certified milk and for storing milk and cream.

Glass-lined Milk Pasteurizers have proved ideal for conditions in India, and are used by most of the Government Military Dairy Farms and by leading private dairies in India.

Dont miss these Special Articles to appear in the next number:

How can Agriculture be advanced by Co-operation?

The Basis of Cattle Improvement in India



THE Student's Magazine

SUPPLEMENT TO

THE ALLAHABAD FARMER

Vol. V. APRIL, 1931 No. 2.

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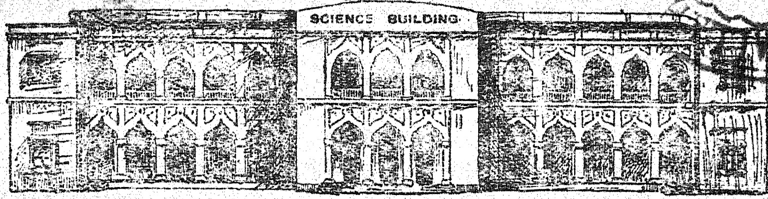

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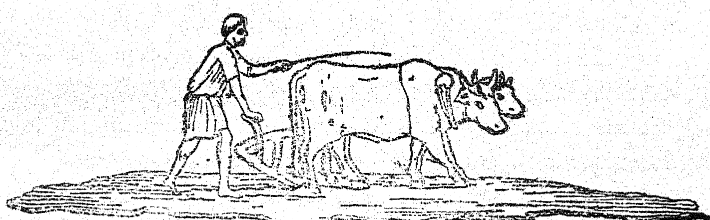


The following supplement to "The Allahabad Farmer" is the result of the aims and aspirations of the student body of the Agricultural Institute, Allahabad, to place on record and extend their ideas and ideals. It is hoped that the supplement will become a regular and permanent feature in the future. This will be attained by the continued and expected increasing support of the whole student body. Passed students are especially encouraged to share their experiences with us through these columns.

PANDIT MOTI LAL NEHRU.

SADHIR C. CHOWDERY.

"He is gone on the mountain
He is lost to the forest
Like a summer dried fountain
When our need was the sorest.
Like the dew on the mountain,
Like the foam on the river,
Like the bubble on the fountain,
Thou art gone and for ever."

"One crowded hour of glorious life,
Is worth an age without a name."

The kings and emperors depart; their recollections are wiped off the pages of people's memory. The Governors and the Captains are totally forgotten after death; many people come on the earth and die "Unwept, unhonoured and unsung" but the memory of Pandit Motilal Nehru lives for ever enshrined in the hearts of men, to be revered generation after generation through all ages.

Seventy years ago, on May 6, 1861, Pandit Motilal Nehru was born at Delhi, the capital city of India. He was the posthumas son of his father. His father, Gangadhar Nehru breathed his last before he was born and he was brought up under the lovely care and affection of his brother Pandit Nandlall Nehru, who had been at that time practising as a Vakil at Delhi.

There is not much in the academical career of Pandit Motialal Nehru that would merit mention. He passed his Entrance Examination from the Government High School at Cawnpore and was then admitted into the Muir Central College, Allahabad, where he underwent his college course for a long four years but did not sit for his degree examination. He had a special aptitude for law. He sat for the Vakil High Court Examination in 1883 and headed the list among the successful candidates. He was always in the good books of his professors and was a favourite student of the eminent educationist, Principal Harrison.

In 1883 Panditji embarked into the voyage of life and began his practice as a lawyer, at Cawnpore, where within the short period of three years, he earned a good name. But soon, owing to some unfavourable circumstances, he left that industrial city for Allahabad and built up a good name and practice in the High Court. Pandit Motilal Nehru was an ornament of the High Court. His wonderful genius and marvellous working capacity won him the admiration and respect of those with whom he worked, and he was enrolled as an Advocate by the Allahabad High Court. As a lawyer he was famous for his sharp power of understanding and for the strength and straightforwardness of his advocacy. He was characterised by a high independence of mind, a great fairness of spirit, a fearlessness for unjust criticism, and, above all, a sturdy determination to mete out even-handed justice. He always fought for the right, undeterred by the frownings of office and uninfluenced by the adominitions of office seekers.

Panditji entered active politics rather late in life. He presided over the U. P. Provincial Congress in 1907 but did not make any conspicuous figure outside his own province. It was in the year 1921 that he suspended his extensive practice at the bar and got down into the field of politics, hand in hand, with the late C.R. Das. He worked for ten years with undaunted spirit, unflinching courage and ardent zeal, suffered, sacrificed and laboured incessantly for the cause of his Motherland and at last found a peaceful shelter in the arena of death. He gave up his his princely practice, tasted the pains and

bitterness of prison life, abandoned all the sweets of life and above all sacrificed his all for the sake of the country.

It was at the age of seventy, that Panditji one of the greatest sons of India passed away. It was not even then that the people of India appreciated him at his worth. The funeral procession of this man showed to the world, what place the country accorded to him in its bosom. It was a scene unprecedented in the history of Allahabad. It was thus that one of the noblest sons of of India passed away in a blaze of glory that nearly dazzled the eyes of the countries of the world. His was a life, great, heroic, and noble to the last degree. The story of his sacrifice for the cause of his Motherland would read like a romance in the history of India. If Motilal was great in life, he was infinitely great in death.

IRRIGATION.

Suraj Singh.

The problem of irrigation is not only the most important but also the most complicated of all questions connected with Indian Agriculture. Experienced cultivators in certain localities are of the opinion that well-water is injurious to crops. Where canal irrigation has been in vogue for a long time, *e.g.*, in parts of the United Provinces, cultivators are of opinion that well irrigation is to be preferred to canal irrigation. Again generally speaking rain water has been found to do more good to crops especially at the beginning of the rainy season, than either canal or well-water.

If well-water or canal water, or tank water under certain circumstances are harmful to crops and if rain-water is more generally beneficial then a cultivator must be cautious in introducing any scheme of irrigation lest he should suffer.

A further complication arises from the different effects of irrigation on different crops. At Sibpur farm it was observed that the use of the canal water benefits potatoes and cabbages while it hurts country peas and beans, when owing to late sowing the latter crop had to be irrigated in December and January. Irrigation with this canal-water benefits all kinds of crops in May and June, while at the driest season from December to April, this canal water injures leguminous crops and seedlings of all kinds. What is the explanation of all this ? It is only if we can understand the theories underlying the question of water adopted for irrigation, that we can avoid mistakes in the use of irrigation water both as regards quantity and quality.

Rain Water.—At the beginning of the rainy season rain water contains in solution and suspension a large amount of foreign substances which are all more or less helpful to agriculture. As the rainy season advances, the

water becomes freer from nitrates, ammonia, organic dust, etc. Hence the greatest invigorating effects on plants is of the early showers of rain. The capacity of rain-water for holding large quantities of carbon-dioxide and ammonia in solution is of especial importance for agriculture. We thus understand how rain-water should benefit the crops in more ways than one and at the early part of the rainy season more than at a later season.

Well and Canal Water.—Here the question arises: Why should not canal, well or spring water do more good than rain-water? Canal, well or spring water contains more substances in solution than rain water, most of which are actually required for plant growth. The danger of using irrigation water lies not in the fact of the possibility of this water being too poor in soluble substances but of its being too rich in such substances.

Plants can take up nourishment only in a very dilute solution. The salts in solution may be one or more of the following:—Sodium chloride, sodium sulphate, magnesium sulphate, calcium chloride, magnesium chloride sodium bi-carbonate, calcium carbonate, calcium sulphate and some silicate, iron and alumina compounds and also some nitrates. Of these salts the calcium carbonate, calcium sulphate, silicon and iron compounds do not harm the crops when they are present in large proportions in irrigation water, as on the evaporation of water after it has been applied to the land these compounds crystallize and do not collect in the soil in soluble form. The accumulation of the other salts in solution may go on until the proportion of soluble salts in the soil reaches the danger point. Herein lies the danger of irrigating with well water or water from low cesspools or canals which contain a high proportion of undesirable solids in solution.

Evaporation.—The question of evaporation further complicates the problem of irrigation. Evaporation is much slower from land under crop than from bare land and is different at different seasons and the whole question of evaporation is of minor importance when one takes into consideration the loss by surface flow and percolation in certain soils. But leaving all these side issues out of consideration we know that as evaporation goes on the residual water becomes more concentrated in soluble salts and the water used for irrigation afterwards may do more harm than good. If storage tanks are made at all for irrigation and well or pool water stored in such tanks they must be made as deep as possible or evaporation should be prevented.

Quantity.—The proportion of moisture imbibed and transpired by a leguminous croP during its growth as determined by actual experiments is about two hundred and eighty times the weight of the dry matter of the crop while in the case of cereals the proportion is about 1:320. But one crop differs much from another Cop in this respect. Roughly speaking 1:300 as the average for crops during the cold weather (European countries) and 1:600 for the hot weather of this country.

Suppose an acre of wheat, including straw, weighs 3 tons and the dry weight is about $2\frac{1}{2}$ tons. The maximum requirement of irrigation water for this crop is $2\frac{1}{2} \times 300 = 750$ tons. Thus the maximum quantity of irrigation water required for this crop agrees very nearly with what is allowed in practice But there are extreme cases of peculiar habits of plants. Gram and some other crops are able to utilise very large quantities of moisture from the nocturnal dew while most varieties of rice are benefited by an accumulation of water at their base.

Value of Canal-irrigation.—Canals are not only of the greatest benefit to the raiyats but they have actually proved remunerative to the state. The silt brought down and distributed to fields has also proved one of the best fertilizers. The manurial value of the silt itself is found to be between Rs. 4 and 5 per acre per annum. In years of scanty rainfall the canal water brings salvation to the crop.

Wherever canal irrigation has been introduced, there raiyats feel that the more water they use the better value they get for the water rates they pay. This is a very serious error which it is the duty of irrigation officers to dispel. By using too much canal or well water one is bound to suffer sooner or later from the effects of over irrigation. The complaint is being heard that canal irrigation has ruined large tracts of land in the United Provinces. It is not the fault of canals but of over-irrigation, and of utilizing the water at the driest season when it is low down and when it contains in solution too high a proportion of solids. One inch of water once a month or at most twice a month should be the maximum allowance in the cold weather and two to six inches in the dry weather according to the period of growth of the plants. From this the quantity obtained by rainfall should be deducted.

Drainage.—As said above over-irrigation or irrigation with water surcharged with soluble salts results in an accumulation of these salts in the soils which gradually renders it barren. When canal irrigation is provided, the means of correcting the evils of irrigation should also be provided. This consists in having drainage channels. Drainage would make much user land fertile. A land which is drained readily parts with its soluble salts. Irrigation canals should be built with a fall of one foot per mile and the drainage channels should have a fall of two feet to the mile. Drainage and irrigation channels should be simultaneously provided wherever water other than rain water is used for growing crops, whether it is well or canal or tank water.

THE SOCIAL SERVCE LEAGUE.

AMULGA KRISHNA ROY.

In the month of July 1929, the staff and students of this Institute decided to organize a society for the purpose of exchanging views on social and religious questions. This group was called the Discussion Group and it met for the first time on the 21st of July 1929. After some weeks the members of this Discussion Group felt it necessary to do some practical work in the neighbouring villages to promote their social conditions. They changed the name to the Social Service League and from that time the League has been doing some charitable work in the villages with the motto "Service to man is service to God". This league is open to all persons connected with the Allahabad Agricultural Institute. The following is a brief outline of the aims and works of the Social Service League.

In the first place there is discussion of social and religious problems among the members and their neighbours. Every Sunday the members and friends of the League meet in a group in the Assembly Hall and discuss various subjects of social and religious interest. In this meeting every one has the power of discussing the subject from his own point of view. In addition to this many other questions of a practical nature of doing work in the villages are solved.

Secondly, the League aims to help and co-operate with neighbouring villagers to better their social conditions. For co-operation with the neighbouring villages, the members of this League have experienced great difficulties. The villagers because of their conservativeness and illiteracy used to fear and suspect the students. But now we are proud in saying that the members of the League have created friendship with them by going to them frequently and removing their difficulties practically and sincerely. The members have settled many disputes and misunderstandings among the villagers and zamindars. Some members are thinking of starting Co-operative Societies and Banks in the villages. Some of the ways in which the league is aiding the village :

1. Medical aid to the sick.

Up to this time our League has treated about thirty persons in our Institute Dispensary. Some of the members also have provided the villagers with medicine and advice. Members of this League visit the neighbouring villages, batch by batch, every week and closely observe the health of the villages

2. Milk to the needy.

The Social Service League has provided many weak village children and sick persons with milk from our Dairy. The League has also helped many helpless invalid persons with food and money. Many times our

members have also been troubled by some professional beggars but now they are, through experience, usually able to identify such.

3. Games to Children.

The League is taking a keen interest in the health of the village children. We have taught the boys some interesting native games and foreign games. To encourage games and physical culture, our League invites village children over here once a year and prizes are given to the winners after competition. Thus there has been created an interest in games among the village children and every evening we find them playing football, which the League has provided for them and practising wrestling and other Indian exercises.

4. Sanitation.

Our Social Service League is trying to improve the sanitation of the villages. The members are very often speaking to the villagers about the need of sanitation. By the guidance of our Faculty Advisor, a village near Naini has started a Sanitation Board They are subscribing money and have engaged sweepers to sweep the village road and clean the drains. We are communicating with the U. P. Lantern Lecture Committee for lending some slides with which to lecture in the villages about sanitation and co-operation.

5. Increasing Literacy

In these villages it is very difficult to start a village school. The parents think that if their sons get an education they will either leave home and their profession or else will become Christians. But the League has managed to establish two village schools and two night schools. In these schools our members regularly teach Hindi, Urdu, and English with some Arithmetic. More than fifty boys and girls are attending these schools every day.

All these things which our Social Service League has been able to do are due only to the heartly co-operation of our staff members to whom we are thankful.

SOME ASPECTS OF THE PRESENT CATTLE SITUATION IN INDIA.

SUDHIR C. CHOWDHERY.

Indian Agriculture is so closely connected with cattle that it is simply impossible to perform a single operation on the farm without their help. They are the keynote of Indian Agriculture and we know full well that Agriculture is and will continue to be the chief support of economic pros-

perity in this land. Moreover the people in India venerate the cow They learn from their childhood to adore cattle. But it is a matter of regret that there is much ignorance even among enlightened people in India concerning the cattle problem.

In India, bulls, cows and buffaloes are the principal kinds of cattle They number about 151 millions or more than 15 crores excluding the native states. Compared with the productivity of the country there is a very large population of cattle and India can boast of having the largest number of cattle of any other country in the world. But the majority of the Indian cattle are of an exceedingly low grade and are in extremely poor condition. Hardly five per cent of them are in good condition and can be ranked with the cattle of other countries The majority are of such poor quality that they would not be allowed to live in any other country. From the economic point of view they are a heavy burden to the country. Some millions of cattle, good for nothing, are maintained in the country simply because we Indians venerate the cattle and lack dairy education. India spends about sixty crores of rupees annually to feed the useless cattle and get in return only farm-yard manure which is used by the Indian farmers, owing to their ignorance, as fuel. What a great waste it is for a poor country like India.

We all know that millions of cows exist in India but do we at all care to learn how much milk they give? A good average is 5lbs a day or 750 lbs per lactation period. It is calculated, however that 1250 lbs milk per annum which is sold at two annas per pound makes it worth while keeping her. In the large cities milk is so expensive that the poor classes can hardly afford to get it, while in many rural districts they seldom or never get it. This is deplorable in a country which is admitted by agricultural experts to offer a field for dairying second to none in the world.

India is very poor in her breeds. It is lack of knowledge and experience which is mainly responsible for this. The best milking breeds of Indian cattle are found in the Punjab, Bombay and Madras and these are the result of careful breeding and rearing. Such breeds are the Scindhi or Red Karachi, Kankrej, Nellore, Hariana, Goe and the Sahiwal, and Tharpakar which have been evolved by the nomadic people of western India. Some pure bred animals though not of the highest rank still survive in some provinces of the Deccan, Central India and Northern India and, in fact, a number of provinces of India have no pure bred cattle at all. The causes of this deterioration are that the best animals are being exported to other countries and many parts of India where they lose vitality and the ability to keep up their yield, moreover thousands of our good cattle go to our cities and towns and end by going to the butcher.

The average Indian village supports a large number of inferior types of cattle of all sizes and shapes. During the day cattle of all ages, including the diseased cattle, are let loose together. All saunter off somewhere outside the village until evening when they make their way home. Absolutely no care seems to be taken in feeding and managing the stock. During the rainy season and some months afterwards, grass grows rapidly on the pastures and there is plenty of food but later on during the hot weather the condition is worse. In some places, people living in close contact with Dairy Institutes or Agricultural Schools learn this important business of rearing cattle and strive hard to give their milch animals and working bullocks an additional ration. But in many cases the financial position of the farmers does not allow them to feed them properly.

In the country there is a want of scientific knowledge about the proper rearing and breeding of cattle. The deterioration of our stock is always aided and accelerated by the ignorance of interest in breeding taken by our cattle owners. Stock-owners do not know anything about veterinary science and little or no care is taken to prevent the outbreaks of contagious diseases. During the day cattle are herded in the grazing ground where cows are very often served by maimed, diseased and useless animals whose progeny swells the enormous number of wretchedly developed animals in the country, which fact adds the deterioration of our stock. The common system of breeding prevalent in the country is to allow a number of bulls to roam about and to serve the cows. These bulls are not owned by any particular individual but by the community at large. They are let loose and it is a common and everyday sight in the bazars of Indian cities to see these bulls going from shop to shop and house to house for their ration. The bulls remain generally in the bazars or outside the cities. Owing to this indiscriminate breeding the city and village herds are mixed and poorly developed.

India's prosperity lies in eliminating the useless animals of the country. If dairying is to play a prominent part in the industries of India, the question of the improvement in the breeding and rearing of milch cattle require prompt alteration which can be done by exterminating all the useless cattle of India and imparting dairy education among Indian farmers.

THE AUTO-BIOGRAPHY OF AN UMBRELLA.

GIRVER DHARI LAL.

"Why are you gazing at me with a look of hatred? Do you think I was always in this wretched condition? Let me tell you frankly I have seen better days and shall see them again. Oh, those charming days, I still remember, when I was a constant and faithful companion of my beloved master. Do you want to hear my life-story? I do not care if you would like to hear it or not but I will surely tell it. They are the bubbles of my heart.

"I come of a very old historical family. My forefathers were the Royal signs of all the Great Indian Kings and Emperors. Some of the members of my family are still occupying those very high posts. In short I am the sign of a Royal people. Though I belong to an ancient Indian family you will be surprised to hear that I was not born in India.

"I stand on one foot and wear a big circular black cloth supported by eight limbs round my leg. When my master wants my service I open these arms and save him from sun or rain, by the help of my garment. I was made along with several thousand other fellows. The workers at the factory took great pains in making me beautiful and stout. I had to pass the expert hands of several men before I assumed my form all of whom added one thing or other towards my shape and body. Some painted my leg with beautiful colours, other fixed a piece of nickle-plated tin around my neck and others put a beautiful silk thread around my throat. The Manager then examined me thoroughly to see whether I was in sound health so as to take the journey to India. Finally I was successful in all the tests. We were then covered in nice papers and put together in a big box which was nicely packed with straw. so that we might not get hurt on the long voyage. From our factory I went to the Railway Station from where I went down to the port by train. At the port I caught the first steamer and sailed for India. This is how I departed from England, my birth-place.

"After a tedious journey of about three weeks, I reached Bombay harbour. I was very happy that I had come to the land of my forefathers—of whom I have told you before, but at the same time I was extremely sorry for I knew that the time had come for me to be separated from my dear chums. Oh how dearly I loved them. As the time of our separation came, we clung to each other, but the stonehearted men, the coolies working on the harbour, dragged us and forcibly separated me from my friends. We tried to stay together for as long as possible but at last had to separate and we did so with a deep sigh and heavy hearts. In this fight one of my fellows got a wound in his body but nobody cared for it. This is one of the acts—I fear I have to call it cruel—of human beings who claim to possess a heart and say that they are kind-hearted.

"One man at last took pity on us and brought us to Allahabad. I then consoled myself with the idea that I will not have to suffer any more pain of separation. But, my friend, nobody knows what is written in one's fate. Now we were kept up nicely. One by one we began to be sold as slaves in the old days. One day my master bought me and this is how I came here. First of all my master was very fond of me but as the rainy season passed away he became careless and kept me in a cover. You see the naughty rats have bitten me at so many places in my body, so much dirt has been deposited but nobody seems to take care. But I am confident, that the summer season is fast approaching so my master will once more take care of me and make me his companion as before. This is the only idea by which I console myself. This is my life history. Before I finish I must thank you for the patience you have shown in hearing my story. All right, I bid you good-bye.

THE LABOUR CREW.

N. K. Sen.

The Institute started the Labour Crew with a view to assist students who need financial aid and like to work. The Prospectus of the Institute reads. "Work can be given outside of school hours to a limited number of students who need financial assistance. Pay is three annas an hour."

Though it is written in the Prospectus that work can be given to a limited number of students, still it has been found that practically every student who wants to work is provided with it. The present number of students studying in the Institute is about seventy among whom about ten students at present are working, although there have been as many as twenty-five. The students are provided with out door work such as, cutting of the grass, clearing land from weeds or thorny shrubs, piling weeds for manure, and doing in door work such as wrapping magazines and sending out letters. A student can earn about ten rupees per month working two hours daily for twentyfive days. And this amount of work is usually done by the students.

By having the Labour Crew, the Institute is arousing a spirit of 'self-help' among the students. They, who work in the Labour Crew, get the satisfaction which comes through self-help. Probably many of them will be farmers in their future lives. And their working system may turn them into men of hard working habit which will be of much help to them later on. This work also teaches them the value of money, which so many students forget to recognise, and thus induces them not to be extravagent in the expenditure of it. The working students may also acquire some knowledge concerning agriculture. We can cite an example to make the point clearer. Perhaps

everybody here in the Institute has seen that some branches of the lemon trees, which are just behind the "Science Building", have been cut off. The students who worked there have surely come to know theoretical, as well as practical knowledge about pruning.

The importance of such financial assistance or scope of self-help to the students, who are in need of such assistance and who are suffering from the piercing biting of financial want, is very great. We, as students of the Institute and especially as members of the Labour Crew, are thanking the Institute for the opportunity it is giving to us.

OUR AGRICULTURAL TRIP.

NIRMALKANTI SEN.

Trips are the most enjoyable and happy hours which one can spend in his college life. The first year agricultural students, have an annual agricultural trip which generally commences at about the end of the session. We, the students of the first year agricultural class, were anxiously waiting for the trip. At last the expected day arrived, and we set out from the Institute at 10 A. M. with cheerful mind and vigour on the 17th February, 1930, under the supervision of our professors Mr. C. P. Dutt and Mr. F. G. Matheson. We got into the third class compartments of the E. I. R Railway train at the Allahabad Station at 10-35 A. M. and the train steamed away.

On the same date we reached Partabgarh and went to the local Government Farm. It consists of 89 acres of land of which 68 acres are under cultivation. Most of the soil of the farm seemed to be silty. We saw, gram, barley, potato, tobacco, ground-nuts, sugarcane, onion, rye and wheat growing. The rotation of crops on the farm was sugarcane followed by wheat and gram. They were also growing oats as a fodder crop. A portion of the farm was *Usar* land (barren). The farm schedule for its reclamation was to grow jawa indigo on those fields for a number of years, until the natural indication of the removal of excess alkali was apparent, this is indicated by the springing up of Bermuda grass. After the fields are fairly covered they are ploughed well, and small pieces of broken earthenware and pebbles are mixed into the soil to facilitate its aeration. Then gram is grown for a few years. At the end of this time the soil becomes fertile and most crops can be grown successfully.

As 4-30 P. M. we left Partabgarh and reached Lucknow at 9-45 the same day. We passed the night comfortably in the Inter-Class Waiting Room of the Station. The next morning at 7-5, we left Lucknow for

Shajahanpur, which we reached at 12-30 on the 18th. There we saw the Government Agricultural Farm; the acreage of the Farm was 163 acres of which 127 acres were under cultivation. There were three cane-crushing machines on the farm driven by oil-engines. One of the machines could crush 30-40 mds. of sugar cane per hour, the percentage of juice extracted being 60-65 lbs. As soon as the juice was taken out from the sugar-cane, it was pumped through pipes to another place for boiling. The kinds of crops grown on the farm, were not numerous, but their growth was good and one could expect a large return from them. The rotation of crops on that farm was sugar-cane, followed by gram and barely or wheat. The complete cycle of rotation was four years. They were receiving good results by growing sunn hemp, as a green manure. We left Shahjahanpur on the same date at 9-30 P. M.

The next place of visit on our programme was Dehra Dun which station we reached the next morning at 7 o'clock. We went to the Ranger's Forest College Hostel for lodging. In the afternoon we began inspecting the Indian Forest Research Institute. The institute is beautifully located at the foot of the Mussoorie-Hills. The main building of the institute is a two-storied one, with pillars and a roof of blocks of wood. We got up near the top of one of the pillars and found ourselves surrounded by the beautiful sceneries of nature. On one side of us there was a green velvety lawn decorated with tiny green conical shrubs arranged in order, while on the other side the Mussoorie Hills raised their lofty peaks into the sky with white snow on their summits. We were very impressed with the surrounding view and visited the Museum Hall, and saw innumerable types of wood, ferns, insects injurious to wood, an artificial model of a forest, by-products of wood, etc., all beautifully arranged and kept carefully in the museum. We were greatly impressed with a cross-section of the trunk of a tree the diameter of which was about 8 feet and the age of the tree had been estimated to be some 300 years old.

From the Museum Halls we passed on to the Engineering Department, and saw along with other things how the rigidity of wood is tested, how card-board and paper is made from bamboo and how woods are made worm-proof.

For the manufacture of paper, bamboo is boiled with sodium hydroxide ($NaOH$) and copper sulphate ($CuSO$ 4) under pressure and stirred well. The fine pulp is strained and dried. Then it is pressed into thin sheets and polished with gruel. Seasoning of wood can be done in two ways, by (1) air and (2) steam. The former process is natural and the latter one is artificial. The seasoning of wood by air is nothing but the exposing of the free atmosphere. The second system is done in the following way: Wood is cut into planks and stacked into a heap inside an air-tight chamber. Precaution is taken so that all the planks may be of the same thickness.

Air is then, with a certain quantity of humidity in the form of steam, forced into chamber. A definite intensity of pressure and temperature is is kept constant for a certain period of time which varies according to the thickness of the planks. To make wood worm-proof creosote vapor is passed into it from all sides by means of pressure. The wood thus treated can be utilized for roofing purposes.

In the afternoon we had a foot-ball match with the institute which resulted in a drawn game.

The next morning we visited the Railway Staff College. There in a spacious hall we saw a miniature Railway Company. The tiny engines were moved by electric current and the Station-Masters and other officers in charge were all working in the same manner as we usually see them. In the afternoon we saw the office of the Survey of India.

The day after we travelled to Rajpur by motor bus with a view to see Mussoorie which is eight miles distant. We ascended to Mussoorie hill on foot by a road which wound round the sides of the hill. On our way we saw trees of various kinds and sizes and a spring by the wayside greatly attracted our attention. The road seemed endless but at last after walking and walking we reached our destination. The first sight which made us very delighted was the snow that was falling around us. We ate snow to our hearts content and then began to play by throwing snow-balls at one another. By that time we were tired as well as hungry and thirsty. We refreshed ourselves with rest and food; and at about 2 P. M. we began descending the hill and within about two hours we reached the foot.

On the 22nd February we left Dehra Dun for Saharanpur. We saw the Government Botancial Gardens which extend over an area of about 500 acres. We saw various kinds of fruit trees grown for timber, dwarf trees and shurbs, succulent and herbacious plants, climbers, palms and cycads, bulbs etc., cannas, chrysanthemums and roses. Small plants can be purchased on payment, from the superintendent of the Gardens.

We left Saharanpur on the next day at 4-30 A. M. and reached Delhi on the 23rd at 11-20 in the morning. We saw the Diwan-i-Khas, the most beautifully decorated hall in the world; the magnificent tomb of the Emperor Humayun; the Kutub Minar, the tallest minaret in the world and other interesting sights. On our tour programme Aligarh was the next place. We arrived there on the 24th at 11 A M. At first we saw the Government Experimental Farm. The acreage of the farm was 88 acres of which 60 acres were under cultivation. The rotation of crops on the farm was wheat and cotton in one year. We saw wheat and sugar-cane growing in the fields. They were applying sodium nitrate ($Na\ No_3$) or ammonium sulphate ($NH_4\ 2\ So_4$) to wheat at the rate of 1 md. 20 seers. per acre. Reclamation of alkali land was being done by using 300 to 600 mds. of

gypsum ($Ca\ So_4$) per acre. The yield of sugar-cane of the farm generally ranges from 910 mds. to 1650 mds per acre. There were two Egyptian wheels on the farm. Each being driven by a pair of bullocks. The diameter of one of the machines was 8 feet and could raise 1300 gallons of water to a height of 3 feet per hour. The other one having a diameter of 10 feet could raise the same amount of water to a height of 4 feet in the same period of time.

After this we went to the Government Demonstration Farm which is a few miles away from the Experimental Farm The Demonstration Farm was extended over an area of 140 acres. Most of the land was under cultivation. We saw peas, sugarcane, wheat, barley, lucerne, etc. growing. The source of irrigation water was a canal. We saw the manufacturing processes of brown sugar made from cane-juice. There were five pans—one reservoir, one cleaner and three concentrators, arranged from a higher to a lower level. The Reservoir had the greatest capacity while that of the last concentrator was the smallest of the three. Sugarcane juice, at first, was poured into the "Reservoir" after being strained. Then some portion of the juice was transferred from the 'Reservoir' to the cleaner and boiled. All the scum was taken off. Here 'Vindi water' was added at the rate of 4 to 8 % of the juice and the juice was kept boiling. A few drops of some sweet oil was added, so that it might it not overflow. Stickiness of the concentrated juice is also said to be removed by the addition of oil. The juice was well stirred during the whole process. When the juice became considerably concentrated, but before charring took place it was poured over a flat pan for cooling and drying. After a little while the 'gur' was mixed with a little quantity of a solution of sodium carbonate ($Na_2\ Co_3$). As the process of stirring the 'gur' with the solution went on, the mixture or 'gur' was gradually becoming whitish and powdery. Thus the brown sugar was prepared.

We left Aligarh on the 24th February and reached Agra on the next day. There, we saw, the Agra Fort and Taj-Mahal. A dream in marble! We also went to Fatehpur-Sikri, the abandoned city.

Cawnpore was the last place we visited and we arrived there on the 27th. All the students were allowed two days' leave. And on the 1st March in the morning we went and saw the Cawnpore Agricultural College. It was then closed due to the breaking out of influenza. We went to the Experimental Farm. An officer of the farm gave us a lecture on cotton. The acreage of the farm was about 600 acres. We saw some general crops of the U. P. growing. And on the same date we returned to Allahabad.

All those days during our trip were full of life, full of gaiety and joy. We were able to see and appreciate what other people around us were doing in agriculture, a knowledge which we, as would-be farmers, ought to know. Perhaps the importance of such a trip cannot be over-estimated.

THE FLOWER.

PROBHU NATH PRASAD.

The leaves were green, the stem was green. But there was something that lacked in the plant. It was the lacking of a flower, charming and alluring. The stock prayed and every leaf joined the prayer; and lo! after a few days the plant looked cheerful. Nature too looked very happy. She smiled to see the lovely buds—she will be decorated by them in the near future. How transporting it was to see all that !

There was a bud just at the top of the plant. The leaves said to it, "We will protect you;" the stock said, "I will rear you" the united effort of the members changed the bud into a flower. Everyone was glad to see its loveliness. Nature's happiness knew no bounds—once she sang, once she danced.

The flower's brilliant hue, its fair gentle form, and over and above all, its everlasting sweet odour set a reaction in the atmosphere. There was a gentle flow in it. The mild air came by; and the flower welcomed it. After a twinkling of an eye, a cheerful smile was felt, and after that a swing was observed. The flower smiled, the air laughed, and the birds sang. The air said, "Ah ! your smell!" The reply was, "Ah! your gentleness!" Thus the one was appreciated by the other.

The air began to play with the flower. Both were happy. The play continued throughout the whole day. Thus the pleasant hours of day were spent. In the end, the perfumed air said, "Your sweet scent is in my heart, Now, the world will know—I love you.'' The flower smiled. "To the ocean of happiness and sorrows;" was the reply. "Then take me also with you, "said the flower, but was unheard.

It was twilight. The evening star glanced through the sky. The world was happy. Nature was changing her form every now and then, but the flower remained the same. It was gay, and was enjoying sweet recollections. But, alas! there occurred a sudden change in the atmosphere. The happy nature began to wail due to fear—there came a gust of wind. The poor flower was overtaken by it. The lovely one was frightened beyond measure. It cried aloud, "Save me ! Save me" ! There was nobody to hear or to help. The wind was laughing with a devil-like voice. The flower wept, submitted, and prayed, but all in vain.

No one knows what happened afterwards. Next morning the flower was found lying on the earth mortally wounded. The green vegetation was weeping; the atmosphere was lamenting. The air was thunderstruck—it could not move. A poet came by. He saw, and two drops of tears in his eyes told the tale of his heart. A philosopher happened to pass by. He could not help sitting near the flower; and a profusion of "water" from his eyes indicated what the world meant to him.

ATHLETICS.

B. P. Singh.

This has been a successful year for tennis, keen interest being taken in the game by the students and staff. Our Principal has given an impetus to the game by his presence.

The Institute was represented in the Y. M. C. A. tournament by Messrs Matheson, B. P. Singh, Vedan Nand, Mohd. Tousif and Pratab Singh, some of whom did fairly well and reached the last stages of the tournament.

Another important feature was the Institute tennis tournament in which there were good entries in the singles and doubles events. There were some keenly contested matches. We congratulate the winners, Mr. Pratap Singh in singles and Messrs Matheson and B. P. Singh in doubles, and wish better-luck-next-time to the runners up, Mr. Mohd Tousif in singles and Dr. Higginbottom and Mr. V. R. Sadasivam in the doubles.

Prizes to the winners and runners up were given away by Mrs. Higginbottom at a very enjoyable tea-party given by her.

POOH ! POOH ! ! THE "LALAJI."

E. T. Gustav.

One day I met one of my friends in the City, who has lived in Allahabad for the last fourteen years. We exchanged greetings very happily. He asked, "Where do you live now-a-days?" I said, "I am studying in the Allahabad Agricultural Institute." What! What!! Agricultural Institute. Where is this blessed den?" "Den—you dare call it a den; friend it is an institution, for the last 25 years, graduating boys for sceintific Agriculture and Dairying in the Modern way up to the Intermediate standard. If you come there one day, I will show you whether it is a blessed den or an Institution giving such education as will help men to serve rightfully their motherland, mentally, physically and morally."

My meeting with my friend, after a long time, gave me much pleasure, but my heart sank within me, when I heard my friend calling my Institute—a blessed den. People say—blessed den; to this great Institution ! ! A word which none of its children should ever hear, but we have to hear, If—?

I cannot blame this poor fellow or any man who questions this great Institution with such respective names, blessed den, wretched place......He does it, because he is quite ignorant of this place and for him it really means a wretched place.

There are several reasons by which our Institute is kept in darkness or is unknown to people. But the reason which I think great though not the greatest, but one of those greatest is the......spirit of Lalaisum.

By Lalaisum in general I mean, those parasites with a narrow outlook of life, and who are neither useful to themselves or even to their friends and hence to the world at large; but are a burden to the world by consuming the national wealth and decomposing after death into organic and inorganic compounds by which they are made.

Typical Lalaisum of a student is this:—He gets up in the morning, dresses himself up, takes his "*chota hazari*", after this, he goes to College and after the College he gets some four hours. In these hours the Lalaisum is its zenith. Really these hours are meant for taking exercise in the open fields of playgrounds, to fresh oneself after the tiring hard mental work of the long day; but poor Lalas, either sit down on the Hostel quadrangle in groups and gossip, or go to their respective rooms and sleep, if not sleeping then sit on the bed like old men and thus pass the precious hours for nothing.

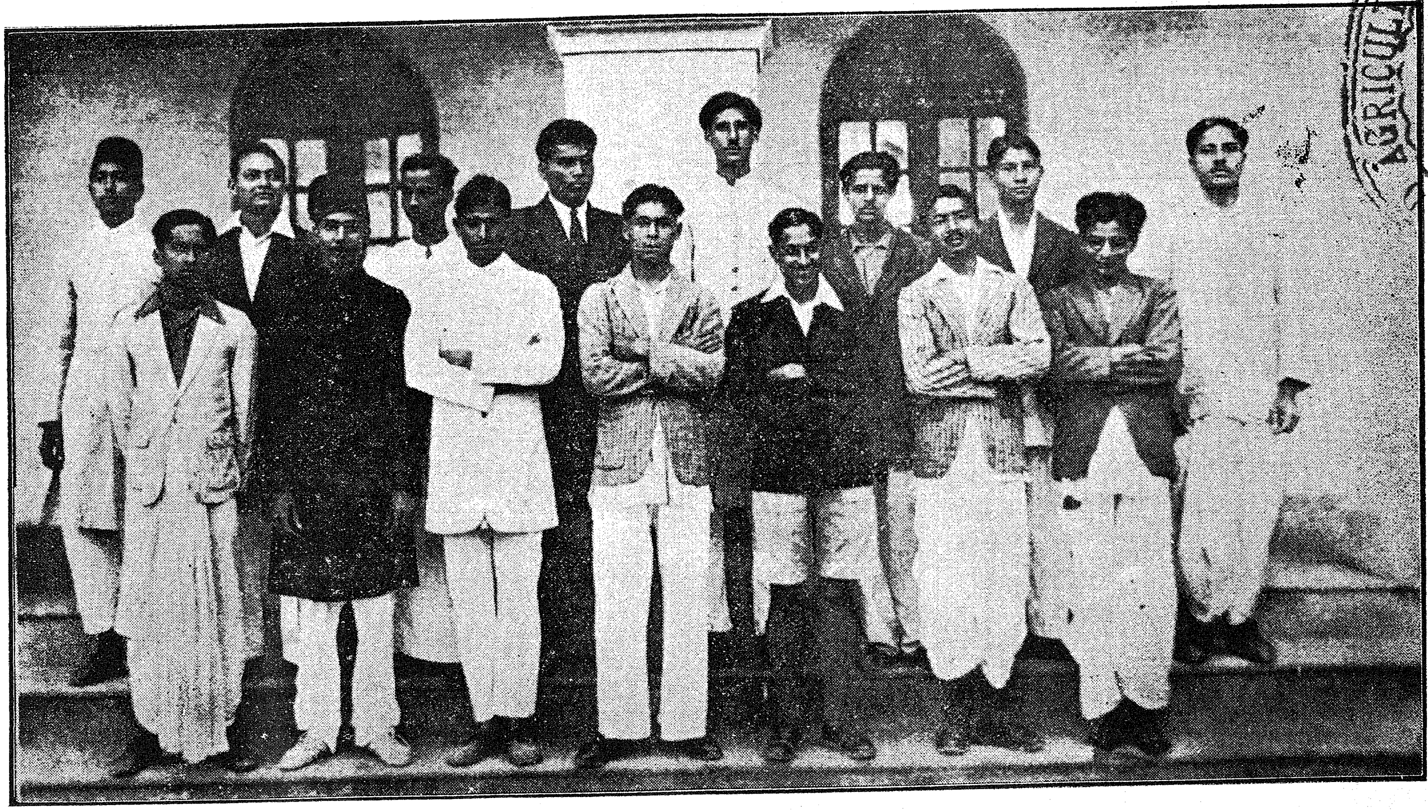
Due to this Lalaisum the Institute's football, hockey,b asketball, volleyball, fields, Gymnasiums, indoor games of the recreation room are not meant for use but for exhibition and to look at them,......thus the great Institution does not get a chance to get popularised.

Now if you ask how these, hockey, football, basketball, volleyball, tennis, field Gymnasiums make an Institution popular, I have a poor opinion for your intelligence. Friends, they do not only make you, your people, your country popular, but they make you mentally, physically and morally stronger. Your name becomes a very-side talk. If you become a good sportsman you are popular, your institutions are popular. Your triumph is her triumph, your fall is her fall.

Friends, don't you feel ashamed by being called a Lala, when you are not? Go to the tennis courts with tennis rackets, crowd the volleyball field; hurry up to the basketball, put elbow grease for the hockey, shoot the football in the atmosphere by your mighty kick, show your feet on the horizontal bars—Show you are no longer a Lala, your Institution no longer a blessed den.

To overcome this Lalaisum if you gird yourself with atheleticism you can easily overcome this parasitic disease.

One thing is quite beyond me to imagine, how a student of the Agricultural Institute whose Motto is "Backbone of India," can ever be a back bone of India if he has a Lalaiatic spirit. He who did not make his Institution popular can never make India popular among other countries. I pity him for not having any back bone. He is a curse in keeping his Institution in darkeness. Might he not cause India the same fortune? Get up and gird yourself with a sportsman spirit and make your Institution shine like the



Graduating Agriculture Class,
1931.

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bright sun in your country. The Sportsmanship will build you bodily, mentally, physically and morally. Will it make you the back-bone of India ?

Friends, this is the time, (when we are in schools or colleges) and not when the hairs are grey; arms are weak; memory is weakened due to over ripening; when the sound is not clear, when the sight is poor, when beautiful nature is a matter of course to you and even the devil refuses to utilize you.

Look at philosopher P. N. Parsad, who got himself enrolled among sportsmen. He realised that living among students of Lalaiatic spirit he was a curse for the Institution, among his people and country. Now he is one of those the first IX of the Institute Volley Ball Team.

Why should we not try for the same honour ? We gave the title Philosopher because he thinks for a time before he does something. If we put even some sweets before him he will think first before he ventures to touch it, but after his meditation, when he decides to perspire due to mastication, he generally finds the tray with a few atoms of sweets which were left by us, while we were quite frank with it during his meditation.

Friends, if you all try for the same honour, Philospher P. N. Prasad got, you can also become one of the first eleven players of any of the games. But I will not advise you to struggle for the title philosopher, otherwise you know what will h-a-p-p-e-n.

One day when we were making Lala a fool discussion, the poor fellow had no argument to support himself, but after long and deep thinking he said, "While playing you take exercise so there is a greater amount of Katabolic process going on. So you require a good nourishing food to keep your body weight constant, which is sometimes very difficult to get." Poor fellow said this without thinking although he looks sometimes as though thinking.

We, the students of the Agricultural Institute, have got every means to get cheap and nourishing food. The Institute Dairy is just a few yards from the Hostel, where fresh milk and its bye-products can be had at any time you like. The Institute is itself altogether situated in such an open place, which we should think a blessing for us. The river Jumna is about 30) yards from it where boating, swimming and all kinds of fun and amusements can be performed.

Friends,—India needs you, she needs you a lot, but not with a Lalaistic spirit, when you are simply a burden to the earth and a disgrace to yourself, your institutions, your people and your country. She needs men with courage to bear hardships. But hardships cannot be born by men having a Lala spirit.

India wants you to free herself, and for that men with brains to think, hands to work are needed, not the Lalas, the parasites. You will be a blessing to your people, institution, and country if you prove yourself to be a man

in the true sense of the word. A man to live and to be heard. To become a man physically, mentally and morally the sportsmen spirit is vitally necessary, but not the Lalaiatic spirit.

THE GRADUATING AGRICULTURE CLASS.

M. J. Zachariah.

The present Agricultural Class consists of sixteen students, representing all parts of India. The following are the names and the few lines written for them show their identity.

B. K. Bose.—Mr. Bose is a handsome Bengali Christian. Before joining the Institute he was in business for a short time and also was a student of the Ewing Christian College, Allahabad. Finding the grapes sour to him he joined the Agricultural Institute. Here he is distinguished by his white shirt and pants irrespective of winter or summer. He is strong enough to break one leg and weak enough to sit at the table to read. In sports he is Jack of them all. He is a humorous chap owing to his Harold Lloyd behaviour and all expect him to join a cinema company shortly. The date of his marriage is questionable.

E. T. Gustav.—Mr. Gustav, is a typical Christian of Central India. He matriculated from the great Punjab University where he narrowly escaped a first division. He is now one of our most promising students of the Class. He is as close a friend to Mr. Bose as the latter is to him. He is marked by his Charlie Chaplain movements. Recently his neighbours have been moved by his melodious music. Some of us insist that it would really move him—away! He is one of the best patronizers of the cinema films. This human horse likes to gallop in the Coral of the cinema films but is afraid of a mare. He anticipates becoming a student of the B. Sc. classes.

G. D. Lal.—Mr. Lal comes from the well-known native State of Gwalior. He passed his Matriculation Examination from the U. P. Board. He tested the I. S. C. Course for one year; but finding it unworthy he came here. Rumour says that he was well-known in his School. As soon as Mr. Lal joined the Institute he was marked by his feminine characterstics. He is very sociable and has many friends. Seeing his physique one wonders how he can stand on his legs; it seems that the has sacrificed his health to disease. Joining class is a bitter medicine to him.

H. L. Bhargava.—Mr. Bhargava has joined the Institute after passing his I. S. C. from the well-known Agra College. He is a typical specimen of the third class successful candidate. If Mr. Bhargava smiles on the

shore of a pond all the lilies in it will blossom. In spite of his temptation he cannot take onions and not to speak of vegetable eggs. The atmosphere of Allahabad is quite suited to Bhargava as his views are being modernised. He is the pilot of his ship and a bachelor in the strict sense of the word. Mr. Bhargava himself does not know what he is going to do.

K. B. P. Singh.—Mr. K. B. P. Singh is an inhabitant of the Agra district and comes from a very aristocratic family. He was a student of the Agra College for several years and in his challenge with the Intermediate Examination, he met defeat which he took in a sportsmanlike spirit. In the Institute he is well known as being unique in the possession of a body of bulky dimensions. He is also known for his wide patriotism which makes him love the whole world equally and hence he is always ready to help other countries even to such an extent of not considering his own. He is very orthodox in his views which are veiled by his polished manners. He is the tennis secretary of the Institute and as expected took the championship of the doubles tournament, which was played recently. He wishes to go to foreign countries for his future study.

K. P. Singh.—Mr. K. P. Singh is the loving son of his father under whom he had his high school training at his home. So naturally, he knew very little of the world before he joined the Institute; which fact made him a good toy in the hands of some. In the Institute somehow or other he is popular. He is growing tall and has made up his mind to defeat Tousif In the class he is a a good student and broke the record of the class in having married at an earlier age than any one else. He changes opinions as you and I change clothes. He is a budding tennis player and won the singles championship of the current year. For such a man as he, the future is uncertain as it depends mostly upon the abnormal company he keeps.

K. C. Sarvaria.—Mr. Sarvaria is an inhabitant of Allahabad and had his High School Course in the Jumna Mission School. It is a rumour that he was popular in the school. He is above the average in the class. But for him sleep is better than studying. He is supposed to know milking better than any other student. While playing it is easy for him to break his leg or hand. He never gets angry and has a smiling face always. We expect him in the B Sc. Class with a plough and hammer in his hand.

Mohd. Tousif.—Mr. Tousif comes from a respectable Mohammedan family. He has passed his Matriculation Examination from the U. P. Board, after great toil. He is the largest man in the class with a nose to match. The proverb "The taller the man the bigger the fool he is" is not very applicable in his case. He is generous minded and impulsive. In the class he is among the average scholaristically. It is very difficult for him to study wholeheartedly in spite of his sitting with the books before him all the day long. Sometimes his mind troubles him, sometimes his heart. His pronunciation of "C"

and "K" is like that of Pistols in Henry the VIth. It is not known why he does not like most of the students. Mr. Tousif is highly impressed by the proverb that "variety is the spice of nature" and so he feels obliged to try another College next year namely, Cawnpore.

N. K. Sen.—Mr. Sen is a Bengali by birth but his life in no way corresponds to it. He is the only man who knows why he came to the Institute. Mr. Sen is very economical in the use of his tongue. Very often a man asking a question is disappointed to find no answer from him. He is a good Chemist in manufacturing gases and hence he has been called as Dr. Kipps. His future is as indecisive as himself.

R. Q. Singh.—Mr. R. Q. Singh has been a friend of Mr. Tousif for the last three or four years. He passed his Matriculation Examination from the U. P. Board. He is a unique character. His Urdu expressions set the class very often in an uproar of laughter. He is a studious student, but it takes long for information to filter through his brains. He is very fond of studying about goats and which is expected of him. There is a tug-of-war between him and money in which he has been victorious all the way.

P. N. Prasad.—Mr. Prasad is a Behari by birth and his dress, food, manners are typical. He took a few years to be Matriculated from the Patna University. In the Institute he began his life as a quiet, timid boy standing high in the class. But the atmosphere of Allahabad has thoroughly changed Mr. Prasad as he is no longer a timid and shy boy, but ranks first among the gossipers although the tone of the gossip is philosophical. He is a polished orthodox Hindu. In money matters Mr. Prasad is very strict although he never fails to perform his part as required. It is hard to understand Mr. Prasad as he is like an amphibian in the respect that he can adjust himself equally well in two different atmospheres. He is a good writer both poetical and philosophical and is very nationalistic in his views.

Undoubtedly it is expected that Mr. Prasad will be a credit to the Institute and to his friends by standing in the first division in the coming Government Examination and the chances are that he will do his higher studies in foreign countries.

S. N. Singh.—Mr. S. N. Singh, is an inhabitant of district Basti and has passed his Matriculation Examination from the Benares University. Had there been no Benares University nobody knows where S. N. Singh would have been! He has tasted F. A. Course for one year. Mr. Singh cannot understand a thing without questioning twenty times. His mind bears very little relation to his body. While sitting in the class he often roams through the whole world not forgetting Benares. He is very fond of enjoying the sweet odour of lovely flowers. Butterflies are always his object of chase. He cannot help taking a bath after his sleep. Although his hair is becoming gray his heart is growing younger. He is quite sincere and straightforward,

He is expected to bring a new creature into this world in the near future. His future is handicapped by his better half.

S. P. Singh.—Mr. S. P. Singh comes from district Sitapur.

He matriculated from the U. P. Board. He is the shortest man in the class and very timid in nature. He is above the average mentally and sarcastic in his remarks. He is the Ashoka Pillar of the Singh party and is an excellent mess manager. Due to his excessive storage of reasoning his skull has bulged out a little at the back. The only game that he likes is volley ball and in that he is very fond of serving. He is fed up with lovely life and so very soon he is expected to be married. He is a true friend and his behaviour is above the average. He anticipates taking the B. Sc. Course.

Veda Nand.—Mr. Veda Nand comes from district Pilibhit. He matriculated from the U. P. Board. In the Institute Mr. Veda Nand began his career as an active and sociable boy so that within a few days he was popular among the students of the hostel. He is an all around intelligent student undoubtedly above the average, but is vociferous and has a slight tint of self conceit. He is a good tennis player and takes a keen interest in games. Mr. Veda Nand is a parrot who repeats the phrase "that does't mean anything." He is expected to join the B. Sc. Classes.

S. Z. Ahmed.—Mr. Ahmad is an inhabitant of Allahabad and has joined the Institute after passing a High Examination in Persian. It is still a mystery how he passed. In the class, physics is difficult to him, chemistry he does not like, botany he does not care to understand, farm crops is too light a subject for him and he keeps the poor zoology always outside doors. This does not mean that he is not a student for he is well versed in theology. He is a typical Mohammadan in every respect. His tender personality carries sorrow to the heart. Let us see how he pulls on with his life.

M. J. Zachariah.—Nobody will doubt that Mr. Zachariah is a South Indian. He passed his School and part of his College days in Travancore. When he appeared in the I. Sc. Examination of the great University of Madras he failed in his mother tongue. So he was very angry and left the University altogether, and came here. He even changed his mother tongue. It seems that his mother tongue changes with change of climate. When he came here he seemed to have just emerged from the Black Sea. But now his conditions seems to be improving. He does not have a moustache as he is afraid it will be of no significance. He is known much for his actions. When he gets excited and speaks, the heavens have the satisfaction of hearing something other than a human voice. At his young age he has lost some of his teeth. No one knows what will happen within ten years. But this much is sure, he will marry. It is hoped that he will bless the B. Sc. Class with his warm presence July next.

MY COLLEGE LIFE.

M. C. Chacko.

It is a matter of fact that it is in our school life that we begin to form our character, the completion of which takes place during the college life. To describe how pleasant and how fortunate we are here, to have the final development of our character under the patronal guidance of a very eminent person, a man of knowledge and thought, is difficult, nay I think impossible.

Before describing my college life I may say something of my previous life. After passing my Matriculation examination, a few years back, I had to remain at home for a year or so on account of failure to get admission to a medical college, which was one of my principal aims.

To remain at home without any work, was really a tedious task for me. I had occasions at certain times to run to the college roads, where I could see my previous class fellows enjoying their lives in the college. During these days, I used to say to myself that God was very unjust. But now O! God, excuse me for those days, for I have fully realized that you are a just God. Though I used to say sometimes that God was very unjust, I used to pray before Him, with folded hands, and tears, nay blood drops flowing down my cheeks to make me enjoy a college life, the real life. Thank God that you have answered my prayers and made me enjoy it in this college to my heart's content.

I joined the college at the very beginning of the session. For the first few months I found my life very troublesome, for I was not accustomed to be away from my parents, to whom I was a pet. But now, after mixing with so many of the students, I am finding myself to be more joyful and comfortable than before. I do not think that any other student in any other college in India has got the privilege of mixing with so many different friends from so many distant places, as we have here in this college. We are here from Ceylon, Travancore, Madras, Orissa, Bengal, Assam and the various other places of India and from Persia, and Fiji Islands too. Though one cannot understand another in his own mother tongue, yet we share with us the experiences of the different places from where we have come and thus make our life very happy.

It is only from the short training I have gained here, that I have a tendency to love plants and animals. And from this short experience, what I have learned of the farmers of India is that the cultivation of India can only be improved if we are able to teach our farmers to really love the crops and animals.

I am glad to note here, that we, the students of this Institute are here, with the same motto of improving the condition of India. This has been the subject of my thinking for the last few years, and thank God I have been placed in such a location as to rightly fulfil my desire.

In conclusion, let me express my sincere thanks which arises from the very bosom of my heart, to the authorities of this Institution, for having this Institute in India, so that her children may be trained in such a way as to become a real back bone of India. May God the Almighty Father bless us all and especially this Institution with all kinds of prosperity, and luxury, so that she may be a real support to India.

The Mission Press, Allahabad

Allahabad Agricultural Institute

PURPOSE

The Agricultural Institute was founded in 1910 by the American Presbyterian Mission. By giving men both practical and theoretical training in modern methods of scientific agriculture and dairying, as well as a thorough general knowledge of the sciences underlying these, it hopes to help India fight its problem of poverty.

LOCATION

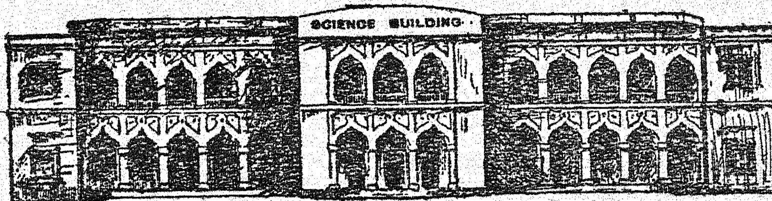
The farm and grounds of the Institute are across the Jumna River from Allahabad proper, about three miles from the Allahabad Station (E. I. R.) and two miles from the Naini Station (E I.R) Besides being easily accessible, it is very beautifully located on the banks of the Jumna River.

STAFF

The staff consists of twelve men, Indians and Americans, trained in agriculture, dairying, engineering and sciences.

A. P. Brooks

THE ALLAHABAD FARMER



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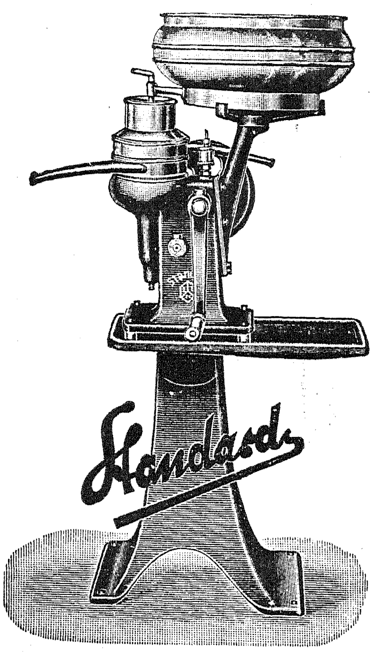

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THE ALLAHABAD FARMER

Vol. V. JULY, 1931 No. 3.

RELIANCE.

Not to the swift, the race ;
Not to the strong, the fight ;
Not to the righteous, perfect grace ;
Not to the wise, the light.

But often faltering feet
Come surest to the goal ;
And they who walk in darkness meet
The sunrise of the soul.

A thousand times by night
The Syrian hosts have died ;
A thousand times the vanquished right
Hath risen, glorified.

The truth the wise men sought
Was spoken by a child ;
The alabaster box was brought
In trembling hands defiled.

Not from my torch, the gleam,
But from the stars above ;
Not from my heart, life's crystal stream,
But from the depths of Love.

—Henry Van Dyke.

A CHEAP SANITARY COWSHED.

MASON VAUGH, B. SC., A. E.

One of the important factors in producing sanitary milk is the cowshed. To adequately serve its purpose, the cowshed should have several desirable features. It should provide adequate shelter, it should provide a sanitary place for the feed, convenient to the attendant and to the cow, and it should provide for the proper care of the excreta, both dung and urine. To be available to the large number of small owners, it must be of moderate cost.

What constitutes adequate shelter? The answer will vary with the location. In the hills of Northern India, where snow and rain come in the winter, only some form of enclosed building in which the temperature may be maintained above freezing can be said to provide adequate shelter. In the plains, probably shelter that protects from the sun and from rain may be considered adequate. Some protection from the hot winds of summer and the cold winds of winter may be desirable, but such shelter can be secured by enclosure on one or two sides or by hedges on the sides from which such winds usually come, or by temporary curtains or other temporary means. Most animals are stabled within the village where adequate protection from wind is secured from surrounding buildings. For the small herd, the lean-to shed, built against another building or a compound wall, is the cheapest and easiest to provide.

The floor is the most important part of such a cowshed as it has most to do with determining whether the building is sanitary or not. In all cases, the floor, manger and manure channels should be pakka. The illustration, shown herewith, shows the dimensions and the design of a suitable floor. In a properly fitted shed, with partitions between animals, the dimensions are adequate for most Indian breeds. The length of floor from manger to manure alley and the width of stall may be increased somewhat for the largest breeds of cattle and for large buffaloes, but the increase should not be much. The distance from the manger to the manure channel should be such that droppings will fall into the channel whether the animal is standing or lying down. The design of the manger is important. Experience has shown that the animal will waste less feed from such a manger as that shown in the drawing than from the high deep mangers often used. Divisions are unnecessary under ordinary conditions and, if desired, should be made of sheet metal and removable so that the whole manger can be well washed out. Satisfactory cleaning is difficult with the ordinary deep box manger. The natural position of a cow when eating is with the head near the ground, and near the feet;

this design provides this position. The high back prevents food being pushed out of the manger and the sloping bottom causes it to slide back down within reach of the cow. Experience has shown that with such a manger the cow will rarely put her foot into the manger for the feed is always within reach. The low front of the manger makes it possible for the cow to lie comfortably with her head over the manger and so reduces the space as compared with a high manger. The front and back walls are made of brick on edge laid in cement and the shape of the floor of the manger is given with cement concrete.

The partitions between animals are made of $1\frac{1}{2}''$ galvanized iron pipe. One piece is bent to the shape shown by pulling it around a simple wooden form. The two pieces are fastened together with a standard elbow, screwed up tight, and the whole is then placed in holes left in the floor and cemented in place. These partitions are important because they keep the animals from turning round and stepping on the udders of other animals. If they are not used, the space per animal must be much more or injury to animals is likely to occur.

These stall partitions are better than brick walls because they are stronger, use less space, interfere less with cleaning and are quite sanitary themselves. They offer no chance for the animal to injure itself on them. They also offer a convenient method of fastening the animal. For this type of barn, the most satisfactory method of fastening is to use a short chain round the neck with a ring on the end to slide up and down on the vertical pipe. These can be bought ready-made at about Rs. 2-8-0 each.

The floor should slope as shown toward the manure gutter which should also slope to one end and should drain into a smal pakka pit from which it can be removed and used as liquid manure or to moisten the compost heap. The urine is itself a valuable manure in that it contains much nitrogen and, if used to moisten the compost heap, composed of weeds, leaves and other waste organic matter, the whole will be turned into valuable manure. The floor and gutter should be washed daily with water and a brush, and the washings also saved in the same way as the urine. The floor and gutter may be still further disinfected by a light sprinkling of chloride of lime which is a cheap and effective disinfectant for this purpose.

Any cheap roof may be used. Since the floor is pakka, it needs no protection. A grass thatch is adequate as protection to the animals, but is not durable, and is objectionable because it constantly showers down dust and dirt which may contaminate the milk. Galvanized iron sheets are quite good on a simple wood frame. Country tile may be used, but, if laid on a bamboo mat, it is advisable to tie the bamboos with a thin wire instead of string

as this will last much longer without repairs. If iron sheets are used, they may be made more comfortable in summer by a thin layer of grass on them or they may be covered with country tile.

The shed shown is for four animals. Its capacity may be increased by making it longer, or two parallel mangers may be used with a feed alley between. In this case, the roof design will have to be changed. Central supports can be provided in two rows just against the mangers. It is desirable to treat the roof timbers with commercial creosote applied with a brush in repeated coats so that it soaks well into the wood. The creosote is much better than tar as it protects the wood better and does not make it sticky to handle.

The same shed can be used for bullocks with equal satisfaction.

[NOTE.—Blue prints are available Re. 1-8-0, as illustrated.]

LUCERNE.

S. R. MISRA.

Part 2.

Irrigation.—The field to be sown with Lucerne should be given a good soaking before seeding. This will enable the plants to grow well until they are a few inches high, after which they can be irrigated again. The critical time with Lucerne is the first six weeks of its growth. Flooding during this time gives plants a set-back from which they recover with difficulty. Drainage must be well provided to keep water from settling into low places and smothering the plants. When Lucerne has become established, a single copious irrigation after each cutting will ordinarily be found sufficient. Irrigation before cutting is undesirable because it leaves the soil so soft as to interfere with cutting and makes the stem sappy. Irrigation experiments with Alfalfa in California show that maximum yields were obtained by the total seasonal application of irrigation water of 36 inches. At Davis it required 42 inches. Experiments carried on at Surat (India) in 1909-10 show the irrigation water requirement of 35·66 inches in fourteen waterings when the rainfall was 53·31 inches, a total of about 89 inches. This does not mean that the crop utilized the whole of this amount. Besides the character of the soil, the amount of irrigation water is more dependent on the duration of rainfall than on its amount. It seems that the amount of water equivalent to 50 to 60 inches of rain distributed over the whole year should be enough under most conditions. The lighter applications given at more frequent intervals tend to give higher

yields than the heavier applications at longer intervals, but the extra cost incurred in frequent waterings is not profitably repaid by the increase in the yield. The Lucerne roots are very deep, but for practical purposes roots in the top six feet of soil are generally considered. From about 71 to 78 % of roots by weight are found in the top two feet of soil. This fact shows that deep soaking of water is more important for the crop than lighter and superficial irrigation in summer than in winter. If there is any break in the monsoon, it will require waterings.

After Cultivation.—A deep and clean cultivation preparatory to Lucerne sowing greatly helps to reduce the cost of weeding afterwards. Care should be taken to save the young Lucerne plants from being smothered by weeds. Weeding before cutting Lucerne is inconvenient and unsatisfactory. After cutting Lucerne, weeds growing between the plants on ridges should be taken out by a khurpi, the ordinary weeding hook used by hand. A bullock hoe can be run between the ridges which will clean the weeds, and smoothen the furrows to allow the easy flow of water. The Planet Junior (hand hoe) can also be suitably used. If Lucerne is sown broadcast, there is no other way save hand weeding. For about four months, mostly July to September, Lucerne has a very bad time. It grows very poorly and seems to be dying, due to heavy rains with high temperature and overcrowding of weeds. During this time the soil is generally too wet to allow weeding or interculture. Weeds must be kept down by cutting with a sickle when they grow too thick and are about to smother the crop. If it is too difficult to get a pure crop of Lucerne, it should be cut long with weeds and fed to stock, discarding those weeds which are very tough and injurious. After the rains are over a good clean weeding should be done. The soil may be tested for acidity by making a cut in the ground with a knife, pressing the earth slightly apart; push in a piece of litmus paper, press the earth together and leave for a few hours. If it shows a pink appearance, it is proof of acidity. Acidity is fatal to Lucerne as the activity of bacteria is greatly hindered in acid soils. About 1,000 pounds of air-slaked lime should be enough for an acre to correct the soil acidity. Lucerne does not need any nitrogenous fertilizer. However, it does need phosphates and potash ; superphosphate has a very useful effect on Lucerne. About 400 pounds of superphosphate should be used while preparing the soil for Lucerne. About 150 pounds should be used per acre in the standing crop. About 10 maunds of well-rotted manure top dressed per acre at the end of the rains has a very salutary effect on the crop. Any manure when applied should be well mixed in the soil. Flooding after manuring should be avoided to prevent washing off the manure. Good treatment of the crop in late September or early October

has a rejuvenating effect on the crop. For permanency and good yield of the crop such treatment is very essential.

Harvesting and Yield.—Harvesting is a very important phase of Lucerne cultivation. The fisrt point to be kept in mind in connection with the harvesting of Lucerne is the eminent value of the leaves. These contain from seventy-five to eighty per cent of the protein of the whole plant, the valuable compound which goes to produce milk and meat. Careful observers have estimated that the loss of leaves is from 15 to 30 % even when cut with the best care. The value of the leaves demands early cutting. Late cutting, besides resulting in more loss of leaves, also delays the next cutting, resulting in reduced yield of the crop. It has been observed at the Institute that the cattle like early cut Lucerne better than that late cut. Up to the time when the crop is one-tenth in bloom Lucerne can be cut with advantage, but it should not be allowed to be more than half in bloom. For soiling, early cut Lucerne is always the best. When the Lucerne is sown in October, the crop will be ready for cutting about two months later. At the first cutting the crop is somewhat uneven in growth, but at later cuttings it is more equal in length It should be rememered that Lucerne is not cut right from the surface of the soil. It is to be cut two or three inches above the soil. The crowns begin to grow immediately after cutting. The number of cuttings that a crop gives varies much according to the climatic conditions and soil conditions. On many farms in the U.S.A. three to five cuttings are considered to be the average number. In manured, irrigated lands the crop gives seven or eight cuttings a year. On well-manured sullage irrigated fields it gives up to 12 cuttings. At the Institute, where we have sullage irrigation and give good manure, we generally get eleven cuttings a year. There is a great variation in yield too. At the Institute during eight months, leaving the rainy seasons, our yield was 675 to 800 mds. per acre. During the rains we do not get a pure crop of Lucerne. Making allowance for the Lucerne that we get in those months along with other grasses and weeds, the yield is nearly one thousand maunds. On canal irrigated, well manured land, it has given about 900 mds.; at Manjri, and in sullage irrigated fields up to 1,200 mds. On ordinary irrigated land the average should be considered from 350 to 550 mds. of Lucerne. .The first year's growth gives comparatively less yield than later years. If seed is to be taken from Lucerne, cutting should be stopped from February. Seeds will be ready by the end of April. At maturity, pods become yellow and they should be cut when yet retaining some moisture. Seeds should be taken from the second or third year's crop.

ENEMIES OF LUCERNE.

Weeds are the greatest enemy of Lucerne. Most failures to raise Lucerne are due more to this one factor than many other factors combined. Deep clean cultivation is the only remedy as already described.

Dodder is a parasite. It grows from its own small seed, throwing up a slender, threadlike stem which twines round the Lucerne stem tightly by sending its feeding suckers through the outside bark. As soon as it is fairly attached to the host plant, the ground connection is severed and it is sustained by the juice of the plant. It continues to grow and spread, sapping the vitality of the host plant. To avoid the introduction of Dodder seeds, Lucerne seed must be perfectly clean of foreign seeds before sowing. When Dodder is noticed in the very beginning, the whole affected plant should at once be uprooted and burnt. Dodder seeds spread very easily and infection increases rapidly. It spreads from the bits of its coils.

If Dodder infection goes too far, it would be better to plough up the field and sow some other crop immune to Dodder infection for some years.

Leaf Spot.—Usually after the first year's growth of the crop there appears upon the upper side of the Lucerne leaves small irregular brownish spots which enlarge to about one-sixteenth of an inch in diameter and penetrate the leaf, turning the whole leaf brown. The plants, as a whole, turn yellow and the leaves drop off. The loss of leaves and reduction in yield constitute its great damage. Frequent wet feet of Lucerne also probably results in the reddening of the leaves and the plant dies.

Lucerne Aphis.—The aphis has presented a great difficulty in Lucerne cultivation in Western India. It is a minute yellowish insect, with dark spots on the back and these spots serve to distinguish it from many other plant lice found on other crops. It is described as follows: Innumerable viviparous insects are, during an attack, seen crowding on the under sides of the leaves and tender shoots of Lucerne, and these suck the sap out by means of a thin beak. The attack commences in the early weeks of March and continues to the end of the hot weather. It is at its height in April, and it decreases and finally disappears in June when the monsoon commences. The enormously rapid increase of aphis is mainly due to the viviparous mode of reproduction among these insects. As soon as an aphis attack is detected the crop should be cut close to the ground and the field should be flooded immediately and thoroughly and the water should be allowed to run off the field, and not to sink in so that the dislodged aphis are carried away by the current of water. If

the aphis is recognized too late, a safer plan would be to spray the crop thoroughly with any contact poison like incosopol or crude oil emulsion.

Lucerne Caterpillar.—Lucerne is sometimes attacked by a moth, Laphagma exigna, the caterpillars of which appear suddenly in large swarms. The moths are medium-sized insects with grey wings, and appear soon after winter, and lay large numbers of eggs in masses covered with brown hair on the top leaves of Lucerne. The young caterpillars hatch within two days, and feed together in a webbing formed by tying the top leaves together. The caterpillars are slightly over an inch long, green with two black strips on the sides of the body. They descend in the soil to pupate, coming out as moths less than a week later, and these produce the second brood of caterpillars in April, which become very destructive to the crop. The webbing of the leaves is the first indication of the pest in a Lucerne field. If it is noticed within two or three days of the laying of the eggs, the large second brood may be checked easily by cutting the crop. At a late stage cutting is not always useful. The caterpillars feed in the mornings and evenings and hide in the soil during the heat of the day. A shallow trench with smooth sides should be dug round the affected plot and a rope should be drawn across the crop in the mornings and evenings. The caterpillars are dislodged from the plants and in trying to escape into neighbouring patches fall into the trench where they can be killed. They can be also easily caught in a bag the same as is used for the collection of rice grass-hoppers.

Rats.—Lucerne has not been an exception to the damage done by rats to field crops. Here certain plants were noticed dying off. An examination of the place showed that burrows existed under the Lucerne roots which were cut by rats. In the United States rats (Gophers) have been a serious Lucerne pest. The rats are kept down by putting poisoned baits (potatoes with sulphate of strychnine or arsenic) in the burrows and covered. Our practice on the farm has been to pump in cyano gas "A" dust well below the rat holes. Before pumping is commenced the delivery pipe is well closed by pressing earth round. Generally there are many holes connected together. The near-by holes should be well closed with earth. About fifteen good deliveries of the dust is found enough. After digging the burrows rats are found lying dead.

Fertilizing Value.—Lucerne ranks as perhaps the greatest fertilizing plant. It gathers nitrogen from the air for its own maintenance and a surplus of that is constantly being added to the soil. It is a deep feeder and leaves the desirable elements in the top soil for future crops. It remarkably changes the nature of the soil. The penetration of the roots to extraordinary depths

improves the aeration of the soil. The decaying roots below and the regular deposit of the leaves on the surface of the soil makes a heavy contribution to the soil fertility. Crops succeeding Alfalfa do remarkably well. Very high results are on record in the United States where it is used in the regular rotation of crops. Professor W.P. Headen of Colorado has estimated that the fertilizing value of stubble and the entire root system of Alfalfa when it has stood for about five years is not less than 35 (dollars) an acre. However, it draws heavily on the potash and phosphoric acid in the soil which must be fertilized by applying manure rich in the two elements for the best growth of the crop and maintaining the permanency of the soil fertility.

Feeding Value.—Lucerne is an excellent forage crop and is eminently fitted for soilage. It is rich in protein, especially in lime, which has a very important place in animal nutrition. Lime is a mineral which is largely required in milk production and exists predominantly in bones. Lucerne is palatable, digestible, mildly laxative, and has a unique appetizing character. A moderate ration of Lucerne keeps cattle in excellent health. Lucerne-fed cattle are rarely constipated. When too much fresh dewy Lucerne is given to cattle, it may cause bloating. Our system of feeding Lucerne is to cut it up at 9 o'clock in the morning and feed it by 11 o'clock, not more than 15 lbs. per head, and we have never had the trouble of bloating in our herd due to Lucerne. Lucerne is greatly needed for young growing animals and an allowance of four lbs. would be highly advisable. In other countries Lucerne is chiefly used as hay, but in India its utility as a green fodder is so great that it hardly leaves a margin for hay-making at present.

Lucerne is nicely suited to Indian conditions. During the rainy season, when we have abundance of grass and green fodders and do not stand in urgent need of Lucerne, its growth declines. During the other parts of the year, when greenness vanishes with the absence of rainfall, Lucerne is seen standing in the field, becoming a far superior substitute for common Indian grasses and fodders. Its failure to grow during the rainy season should not discourage farmers. Provision of drainage and frequent clipping of the quick-growing weeds would maintain the establishment of the crop. A good cultivation and manuring of the Lucerne field after the rains would more than repay for the loss of yield in the rainy season. In the United States Lucerne is not only profitably fed to milk cattle and horses, but also to mules, swine, sheep, and poultry.

Lucerne is the best source of protein supply on a farm and gives more digestible protein per acre, per year, than any of the

commonly grown Indian grains and fodders as is seen in the following table:—

Feeds.	Approx. yields per acre. Mds.	Digestible true protein per cent.	Dig. true protein per acre.	Dig true protein per acre per year.
Lucerne, green ..	700	1·7		11·9
Maize fodder ..	560	·61		3·416
Maize fodder ..	300	·61	1·83	
Wheat grain ..	16	7·55	1·208	
Wheat straw ..	25	·56	·14	3·636
Mustard cake ..	2	22·9	·458	
Jowar fodder ..	400	·47	1·88	
Gram ..	12	11 6	1·3992	
Gram straw ..	16	1·05	·164	4·1902
Linseed cake ..	3	24·9	·747	
Jowar fodder ..	400		1·88	
Berseem ..	450	1·90	8·55	10·43

Yields of crops are estimated on irrigated, manured fields as they ought to be. The table shows that Lucerne excels any of the common yearly rotations of crops in the supply of digestible true protein.

Berseem is not yet a common fodder crop in India. Lucerne can go a long way to help the Indian farmer to cut down the grain ration given to his cattle and provide a cheaper balanced ration, or to maintain his live stock in a far better condition of health where he has not been able or inadequately able to supply an expensive grain ration. The value of Lucerne has revolutionized farming among Western farmers and the recognition of its value has not been wanting in India where it has been grown. Lucerne is a forage crop and cannot profitably dispense with the feeding of the grain ration to live stock, but it does point a way, in its wider cultivation, to considerably solve the fodder problem of India, acute as it is to-day.

THE LOCUST PEST OF WESTERN INDIA

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These notes pertain to the large locust (Acridium peregrinum-Family-Acrididoe) found in Western India proper (Sindh and Rajputana); and are based upon the actual observations made, newspaper reports and information gathered by me during my

visit to this my mother country during the last summer vacation (August and September, 1929) and present rainy season, up to date, the periodical prevalence and the cycle of gregariousness of the pest being continuous, more or less.

The major portion of the country under review is a poor sandy waste-land, interspersed with partially and rather primitively cultivated scattered patches in hills and sand-dunes or more or less extensive cultivations in the plains of the Great Indian desert, called "The Thar and Parkar desert," in the north-west of India.

The physical features of the country, in the main, are monotonously sand-ridden, almost open, giving the perspective of a sea of sand all round, up to the horizon, when looked at from the top of a high sand-dune or peak of a submerged hill range with many undulations and small islands like chains or groups of them, especially in the central, south-eastern and north-western portion of this sea of sand.

There are no deep-cut rivers, water-courses or ravines, except the gently sloping calcareous, kankery deposits, at the outskirts of hills; towards the east, the only big river being "Luni" arising from the central Aravallis mountains with its about a dozen tributaries carrying into it drainage of the western aspects of the same hill range; they all assume the appearances of shallow, broad, dry, almost straightened or lightly curved carvings as soon as they leave the outskirts of the hills and enter the premises of the desert plains, being choked up with the continuously incoming sand, blown in the counter direction by the south-westerly wind.

The climate of the country, on the whole, is dry and healthy, at times of the year going to both the extremes, when it becomes treacherous, too, causing occasional frosts, droughts and pests, resulting in severe or light famines or scarcities pest depredations and pestilences, especially amongst the domesticated cattle and agricultural crops.

The rainfall is irregular, often meagre, 4″ to 12″ average (rarely abnormally heavy, in the outlying hills, causing floods and torrential flows), late or early-ceasing, with long or short breaks in between. The distribution of rains is confined to less than four months—July to October; hence, the rainy season is locally called "Cho-Másá" (or quadri-months season).

The wind is generally dry, south-westerly and violent, all the year round, except during the rainy season, when north-easterly and south-westerly winds, called "Sooriya" and "Purwai," also prevail, for a few weeks, bringing greater rains.

The south-westerly winds become extremely violent, hot and scorching in the midsummer, when they are nicknamed "Loo" (derived from the local word "La" meaning fire) causing frequent dust-storms called "Andhis" (literally meaning "Blind" so called

owing to the darkness they produce, even in the daytime, screening the sunlight by the thick sandy envelope, all over).

Sometimes the north-easterly winds, extremely cold and biting, from the Himalayan side, also prevail, for a few weeks in the late winter, and cause pest and disease in crops, cattle and animals. Winter rains are rare and meagre, and do a lot of good to irrigated or non-irrigated dry farming corps of the winter season, *viz.*, wheat, barley, gram, oil-seeds, etc.

There are no perennial streams or rivers, and the crops, animals and men all depend mainly upon wells (which are often too deep, especially in the western desert region - where the average depth is 200 ft.-300 ft., some being as deep as 400-500 ft.). A few artificial Bundhs have, however, been constructed by the State, of late, and they help much in irrigating crops.

The flora is mostly arid or of a dry deciduous type represented largely by the natural order Leguminose (Principal genera being Prosopis, Acacias, Indigo-feras, Albizzias, Cassias, etc.), Zizyphus spp. of Rhamneae, Capparis capparideae, with other orders and genera, *viz.*, Grewias, Euphorbias, Ficuses, Melias, Salvadoras, Calotropis, Colligenum, Rhus, etc.

Fauna is likewise limited, too; rodents, deers, Rozh (Nilgai), sambhar, bear, jackal, hyaenas, foxes, wolves, tigers, panthers, leopards, pigs, lizards, serpents, etc., are the main species.

Birds are fairly numerous, the chief being sparrows, partridges, peacocks, fowls, bulbuls, parrots, bhaiyas, owls, bats, crows, kites, quills, vultures, etc.; small fishes and frogs are but few and are found only in the few ponds and wells.

Insects are also few, but they, like locusts, khartids (crickets), etc., assume formidable gregarious proportions, occasionally, and become pests causing havoc amongst crops, grasses and wild flora. Domesticated cattle consist of cow, camel, horse, buffalo, goat and sheep, ass, dog and pig, in order of merit.

As a result of the poor dry soil, scarcity of water, paucity of rains and other inclemencies of weather, much of the area remains uncultivated or fallow, more than 50 per cent of the area having never come under the plough, in the knowledge of the present generation.

The crops raised are hardy and poor, millets, sesamum, pulses being the main items in the kharif or rainy unirrigated crops; and barley, wheat and gram in the winter or irrigated crops which are raised, however, in but few favoured localities.

The old primitive bullock-ploughs and simple tools and implements are still in general use. Bullocks and buffaloes are the plough cattle, the camel being yoked in some purely desert areas. Irrigation is done with well-water lifted up by means of the Persian-wheel or rope and mote—a costly and wasteful operation, though

well within the means and management of the local artisans and agriculturists.

Failures of crops, either one or both, is common, and the peasant bewailings and distresses are seldom completely off.

The peasant is heavily debt-ridden.

The whole population is, therefore, agricultural-*cum*-pastoral; cottage industries, like woodwork, weaving, quarrying, etc., being few and mainly seasonal ones, as aids to agriculture.

Cattle are indiscriminately multiplied, partially cared for, poor and generally dry-pasture-fed, depending on the mercy of the elements and inclemencies of weather, which are harsh ; epidemics and famines are frequent and play havoc ; the business both of cattle farming and agriculture are becoming burdensome and occasionally unremunerative ; old habits of storage of food and fodder are giving way to ready and easy but forced marketing under pressure of loans, rent and tax payments in cash, easy exports, temptations and easy-going and indiscreet living, etc.

Manuring is little attended to and proper manuring is not understood.

Co-operative systems, reforms in extravagance and removal of ignorance with speedy and widespread rural reconstruction and education are badly wanted.

The true habitat of the locust is the hard, dire wilderness, least populated and cultivated, and immune from attacks of its enemy, birds and insects, in the Great Indian desert of Sindh and Rajputana and the neighbouring desert of Baluchistan, where the species manages to live, throughout, as seed-bearers or parental stock, even during the decline of its cycle of gregariousness ; wherefrom they spread, by dint of their prolific regenerative power and strongly gregarious habits of living, attack and progress, under favourable conditions of weather and vegetation in the life-cycle.

Without dilating upon the already well-known and better described life-history, physiography, anatomy, etc., of the locust, its salient aspects of origin, spread and depredations, as locally observed and experienced, are given below :—

The conditions congenial to its rapid multiplication, prosperity and growth are, at the outset of the monsoon rains, *i.e.*, about July, a sandy, porous, well-drained, moist, warm soil, followed by continuous sultry, cloudy and drizzling weather, at the time of egg-laying, to enable the elongated abdomens and ovaries to pierce through 3″ to 5″ deep, for depositions ; the mother insect is in search of both such regenerative beds and such congenial conditions of weather before settling down for egg-laying purposes. Irregularity of rains and fickleness of weather, therefore, are conducive to a more widespread occupation of the country for egg-

laying; as the locusts divide themselves into detachments, wandering in different directions, in search of suitable localities and weather; and settle down at different times, in various suitable localities, as they happen to find them or come across them. Thus both the area infested with the pest and also the time of emergence of the larvae are extended, rendering the future havoc by it more widespread; and, the battle for its destruction by the agriculturists, etc., more difficult, deleterious and complicated, as has, unfortunately, been the case, these years.

The last year, at the outset of the monsoon rains, the distribution of the rainfall was very irregular; so much so, that it was early or timely, coming at the end of June, at the south-western and north-eastern hilly environs of the Aravallis; while being more than a month late (first fall coming at the end of July) in the central and south-western or north-eastern desert or semi-desert regions. The detachments of mother locust swarms continued to hunt about the country, for suitable settling colonies, from east to west and north to south, over hundreds of miles, for egg-laying earlier in the east along Luni river tributaries and outskirts of Aravallis hills, where there are, all along, more or less huge deposits of blown and drifted erosion sand of long ages; while towards the west and centre, the remaining detachments that apparently could not all be accommodated in the narrow and scattered available sandy areas, travelled back or halted; and held back and settled for regeneration purposes at the end of July or beginning of August. Similarly, the locust colonies appear to have settled, at different times, from west to south-west corners. All these beliefs and facts were evident from the swarms of locusts in more than one stage-winged and un-winged, moving together, in one and the same locality and direction, as well as locusts of different ages or stages having been reported to appear and move about, at different times, in the different localities above named. Even in the very same part of the country, where local rains fell earlier or later, not only the egg-laying but also hatching or consequent emergence of larvae were irregular, both in point of time and space. And, hence, mixed armies or swarms of advanced larvae and imagoes were the wonder and curse of this year's locust visitation, as especially observed in Marwar State, over hundreds of miles; and so the task and struggle of combating the pest and saving the crops were and are more prolonged and hard, troublesome and minous.

The (snapshot) photo-views taken by me at Marwar Junction Station (Jodhpur Railway and Bombay, Baroda and Central India Ry. Junction) reveal the onward march and depredations on local wild and cultivated vegetation of such mixed forces of locust—dusty or dusky reddish larvae and pinkish yellow imagoes, the

larvae with their prominent head and antennae and curved raised abdomens, marching like infantry, sweeping off under tiny feet low-lying vegetation ; while the winged adult locusts galloping like flying columns of cavalry and air forces, attacking and destroying the top vegetation, fruits and flowers, sparing not even the loftiest date palms, sturdy babuls (acacia arabica) and khejras (prosopis) and majestic Banyan (ficus indica) trees. Of course, these tiny, dirty, dusky coloured creatures (mosquito and flea like), on their first emergence from eggs, begin their first depredations on the fresh, virgin vegetable life, the germ stage pubescence, cotyledons, etc., of grasses, herbage, cereals, etc., and, gradually, stage by stage, growing, casting seven molts from egg to imago stages, as their biting mouth jaws (mandibles) grow stronger, and their voracity and wonderfully quick digestive and devouring power increases, they fall upon everything green, and tender twigs of hardy forest trees, devouring them, bit by bit, stripping them naked and beheading and disarming all erect vegetable life, even devouring, clean, the dead cuticle and tender bast of dry thorny twigs of zizyphus and capparis, used as extensive fencing around fields and cottages, etc., especially during night time, when in dense congregation force, they rest on them or rather take shelter in them, turning gay, juicy, productive, promising verdure into a ghostly, dreary, bleached, mutilated and wholly or partially and more or less prostrated relic, to the misfortune and bewailings of the agriculturist, pastoralist, planter and cattle, as well as wild herbivorous fauna concerned, over hundreds of square miles, in fields and forests, equally ; and, this, in an aggravated condition, as an after-effect of it, especially when the contemporary rains, too, cease early (as has unluckily been the case, these two years, in these parts). In their depredations, the loose paranchymatic portion of leaf, etc., structures and succulent soft flowers, fruits, etc., are preferred and attacked prior to harder and prosen-chymatic hard and fibrous or lignified parts of broad-leaved and softer foliage of pulses, millets, etc., rinds and ever-green soft cellular bark of capparis shrubs, etc., are lustily attacked and eaten off; while rough and hard leaves, petioles, etc., like those of date, bitter parts like melias, pungent like salvadore, are spared, if softer and better products are available, and, even when attacked, are not so completely eaten away.

The universal law and phenomenon of "struggle for existence" and "survival of the fittest" are well evidenced in this great war between locust on one side, and vegetable and their dependents or interested animal-allies, chiefly the "birds" or so-called air-force-allies, on the other side.

From the day that the first emergence of the larvae takes place, this complicated and incessantly continued struggle com-

mences. The locust being strictly herbivorous, is the enemy, directly and firstly of all vegetable life ; and indirectly of all men, cattle and other animal life, dependent upon the vegetable life it attacks ; and so, its friends being none, its enemies are numerous and varied, from men to lowermost animals thus interested, besides some spontaneous carnivorous animals.

Its principal and first chosen victim is the cereals or, for the matter of that, all cultivated vegetable life, succulent, soft, tender, green and fresh. Hence, the first challenged enemy of locusts are the agriculturists who co-operate, as opposing forces, with spades and forks, as weapons, in hands, to ditch, bury and burn. The bird, as allies of the agriculturists, carry on an intensive campaign for the destruction of the common foe, in a sort of strategic manner.

The vultures, after being fed up to the nose, fill up their neck sacs, to their utmost capacity ; the kites, sparrows and crows, besides making a ruthless havoc, store up booty in their nests; the Bhaiya bird (blackbird) in popular belief playfully kills hundreds of locusts before devouring a single one as a well-earned prize. They, in their respective camps, confer as in war councils, especially in the approaching dark of the evening, besieging the locust haunts, hiding places and halts, in tangle of vegetation, after a hard day's battle as though manœuvring for the next day's attack.

The benumbing chilly mornings and evenings, when the locusts are sluggish in their movements, are the best time to make a fresh attack upon them for their devastation.

Chemical poisons and mechanical contrivances are being introduced by the State, to kill the evil in the bud, by destroying eggs and early larvae, but they are beyond the means of the cultivators, poor and ignorant as they are ; still much aid and encouragement are thus forthcoming, and good results are expected.

Locusts are dislocated in their movements by rain-storms and dust-storms when the forced rapid flight of their swarms, hotly pursued by parties of birds—all driven fast ahead of the gales or pushes of clouds, rain or dust-ridden violent winds—produce a terrible sight and loud noise akin to that of a flight of aeroplanes.

Floods, torrential flows of rainwater and broad perennial rivers, wet climate and dense extensive ever-green forests and wild tangle of jungle are great impediments to their gregarious migrations.

THE DEVELOPMENT OF ELECTRICAL REFRIGERATION.

KELVINATOR SALES CORPORATION, U. S. A.

By reason of the fact that the greatest development of applied small unit refrigeration has taken place within the present decade, the great majority of men upon whom the burden of small unit service has fallen are men whose earlier training has not particularly fitted them for their work. As a result of this, they are working with a machine, the operation and principles of which are vague to them. This lack of knowledge on their part handicaps their work and hinders their progress.

If the coming years produce development of refrigeration application of the same magnitude as the past few years have shown, this condition will soon cease to exist, and even the general public will then be as familiar with mechanical refrigeration as they now are with the automobile and the radio. When that day comes, it will be a happy one for the owner of small unit refrigeration apparatus, for then his equipment will be assured of the intelligent service which is so essential to its satisfactory functioning and which at present is so often lacking, just because the man now rendering the service has never had the opportunity to learn the principles which underlie the operation of a refrigeration system. Although a man has not had the opportunity to study refrigeration, his case is not a hopeless one, for the principles of refrigeration and the operation of most of the present successful units are so simple that he may master them with very little study if only they are presented to him in the proper form.

The practice of cooling bodies below the temperature of the atmosphere has been carried on for centuries, although in the light of our present-day methods the earlier attempts at refrigeration were decidedly crude. The earliest method, and perhaps one of the most widely used, consisted of placing the article to be cooled in a cave or other cool place, and, although this method was of some benefit, it was possible to secure temperatures of only a few degrees lower than those generally available. Later on, the secret of cooling liquids by evaporation was stumbled upon and porous earthenware jars were made use of. The water which was to be cooled was placed in these vessels, and some of it, by soaking through and evaporating on the surface of the vessels, produced a certain amount of cooling in the remainder. This method is still made use of in some localities where the atmosphere is dry and evaporation correspondingly rapid. However, all these methods were decidedly limited in their effectiveness, and a statement by Lord Bacon expressed very well the condition of affairs during this time : "Heat and cold are nature's two hands whereby she chiefly worketh, and heat we have in readiness in respect

to the fire, but for cold we must stay till it cometh or seek it in deep caves or high mountains and when all is gone we cannot obtain it in any great degree, for furnaces of fire are far hotter than a summer's sun, but vaults and hills are not much colder than a winter's frost." Lord Bacon well realized what a useful thing it would be if man could have the same command of cold as of heat.

The effectiveness of ice and snow for refrigeration purposes was early realized, and history records that the Emperor Nero had vast numbers of slaves whose duty it was to bring snow from the mountain tops in order that the Emperor's wines might be served to him at the proper temperature. Alexander the Great also realized one of the advantages of proper refrigeration, and it was his habit to send his soldiers into battle in the proper fighting spirit by supplying them with wines and beverages which had previously been artificially cooled.

Saladin, leader of the Mohammedan army in the East, is said to have greatly surprised Richard The Lion Hearted, during the latter's illness, by sending him a frozen sherbet. Early in the thirteenth century Marco Polo, a great Italian navigator, brought the first recipe for water and milk ices from Japan and China showing that some form of refrigeration must have been practised at that time in those countries.

The people of the older countries, especially of those sections in which the consumption of wine is large, have always been devotees of better living, and history gives record of the many uses to which they have put ice and snow. Today many of these people still harvest their own ice from the lakes and rivers and store it in caves or partially insulated ice houses for use during the warmer months of the year.

The production of ice seems to have been the incentive for the work of the early inventors and engineers, but as time went on the refrigeration requirements of meat packing, brewing and other industrial enterprises, and the application of refrigeration to the preservation of perishable food products and the manufacture of icecream outgrew the scope of ice refrigeration, and the need for direct refrigeration became evident. The requirements of these industries are very largely responsible for the present development of mechanical refrigeration.

The first machine to produce ice by purely mechanical means was the invention of Dr. Wm. Cullen in 1775, and the history of mechanical refrigeration may be said to date from that year. Dr. Cullen's invention consisted of a vessel of water which was connected to a vacuum pump. By means of the pump he so greatly reduced the pressure within the vessel that the water in it was forced to evaporate. As a result of this evaporation enough heat was carried away to turn the remaining water into ice. This prin-

ciple is known as the vacuum process, and several machines were later constructed to operate upon it.

In 1810, knowing the affinity of sulphuric acid for water, Sir John Leslie succeeded in making ice by an application of this principle.

The credit of inventing the first machine along the lines of our modern apparatus is given to Jacob Perkins, an American engineer. The ice machine perfected by Perkins consisted of a compressor, evaporator, condensor and expansion valve quite similar to those now in use, and was successful in producing ice in commercial quantities.

In 1853 Professor A. T. Twining of New Haven, Conn., U.S.A., using sulphuric ether as a refrigerant, built a machine capable of producing ice at the rate of 1,600 pounds in 24 hours. In comparison with this achievement we today have refrigeration machines of 400-ton ice-making capacity. In 1851 Dr. John Gorrie of Alpalachicola, Fla., patented the first compressed air refrigerating machine, which was the forerunner of present-day dense air machines. In 1861 Dr. Alexander Cook invented a compressed air machine with a pump and hot and cold chambers. This machine was operated from the burning of coal, and is said to have produced four pounds of ice for every pound of coal consumed. Although a remarkable achievement at that day, this machine appears very inefficient when compared with our modern ice-making plants, which are capable of producing two or three times this amount of ice for every pound of coal fed to them. In 1873 Raoul Pictet produced the first SO_2 machine, using, as a refrigerant, a liquid consisting of 97 % SO_2 and 3 % CO_2.

From 1875 to 1878 Mr. David Doyle worked on the compressor type of ammonia machine, and is given credit for doing the most towards the development of the ammonia machine during that period.

A great many other names and events stand out in the history of the development of mechanical refrigeration, but lack of space prevents their mention here.

Although the art of mechanical refrigeration has made steady progress ever since its beginning, it has been somewhat retarded in most localities by the abundance and cheapness of natural ice. Within the last few years, however, there have been several off-seasons in the natural ice supply, and the demand for mechanical refrigeration has correspondingly increased. In addition to this, by virtue of its many advantages, such as cleanliness, convenience and accurate control of temperature, mechanical refrigeration is constantly forcing itself to the front, with the result that ice refrigeration systems are being discarded almost as rapidly as mechanical systems can be designed to take their places. The

mechanical ice-cream cabinet is only one of the many examples of this.

The use of mechanical refrigeration is by no means confined to those industries which have to do with the storage and preservation of food products, but is finding a large application in a great many manufacturing processes. A recent and interesting use for mechanical refrigeration has been found by the manufacturers of wood pulp paper. A large amount of sulphuric acid is used by these concerns in the production of their product, and it was formerly necessary to discharge all of the waste acid into the lakes or rivers, resulting in the pollution of those bodies and the killing of the fish life in them. The used acid is now discharged into a large receptacle, the temperature of which is reduced by refrigeration to such an extent that the greater portion of the acid is now recovered.

Lumber yards, especially those interested in furnishing high-grade lumber for aeroplanes, pianos, phonographs, etc., use mechanical refrigeration for removing the moisture from the air before it is admitted to their drying kilns. The oil and steel industries are also finding uses for mechanical refrigeration both in their laboratories and factories.

A very interesting example of mechanical refrigeration is to be found in the factory of a large motor car company at Detroit. There a testing room has been built in which it is possible to obtain almost any temperature desired. The car or engine to be tested is placed in this room and in one particular test the temperature was reduced to, and held constantly at, 20 degrees below zero. In connection with the test, a blower was so arranged as to direct a current of air against the radiator of the test car, so that all the conditions of low temperature operation were created without going outside the plant itself.

Another large and continually growing field for mechanical refrigeration is to be found in the artificial cooling of theatres and department stores during the warmer months of the year. Such a use of refrigeration has clearly demonstrated its economic value. In connection with theatres and show houses, experience has shown it almost impossible to keep the summer attendance anywhere near that of the winter, even in the face of considerable price reductions. The application of refrigeration, however, has overcome the heat problem and in many cases is making the summer business the greatest of the entire year. The cooling of the atmosphere in the theatre building shows the feasibility of this idea, and it is but a step from the refrigeration of public buildings to the artificial cooling of the rooms in our homes, and without a doubt the coming years will find some of us cooling our homes in the summer just as we now heat them in the winter.

In fact, the two processes may be so combined under the one control as to provide us with constant room temperatures throughout the entire year.

Some of the examples of mechanical refrigeration just quoted no doubt require the use of large manually operated units. A great many of them, however, are the proper field for the smaller automatic machines, and, as this type is further perfected, we may even find batteries of them being used where one large machine is now serving.

No mention has yet been made of the opportunity for the use of mechanical refrigeration which presents itself in the case of the railway refrigerated car. Thousands of these cars are constantly in operation, and are still being cooled by ice only because the proper adaptation of the mechanical unit has not yet been made to them. The Pullman cars and day coaches also offer a field for mechanical refrigeration units, and especially in view of the rapid electrification of railroads which is now taking place, the future will no doubt show us thousands of them in service on our railroads.

THE PRINCIPLE OF CO-OPERATION*

Sir Rabindranath Tagore

The discreet civilisation of Asia could not influence the modern age as European civilisation has done. The reason is obvious: Co-operation is at the bottom of all progressive activity. Man has become what he is through co-operation, and civilisation, if it means anything, means the co-operation of many men.

The quadruped, with four legs and no hands, do indeed somehow manage to live, but such a precarious existence is a confession of poverty and defeat. Man, fortunately, has two hands to work with, and, his sphere of activity thus infinitely extended, has made him victorious over other animals, and he is now the ruler of the world. Whenever he invents machinery that adds to his strength, he takes a forward step in his career of conquest. Want of such power is proper to brutes; man is destined for their complete realisation. It is no good advising him to stultify his powers as he will never listen to it. A nation that has not acquired control over machinery, the vehicle of human power, is sure to be defeated as completely as has been the defeat of the brutes by man.

So the problem before us is how to evolve a harmony out of this opposition, how not to cry halt and set a limit to power and at the same time make organised power inoperative against man.

* Extracts reprinted from the Bengal Co-operative Journal, Vol, XV. No. 3.

The same remark applies as well to the economic sphere. *Wealth now is held in the tight grip of a small capitalist group.* Yet a capitalist's influence depends upon the fact that he can bring under his control the labour of a number of men. His capital is only a symbolic representation of the capacity for work of a number of men. *Capital, in reality, is nothing but this capacity for work, and is therefore directly possessed by every individual worker.* The working men can become as powerful as the capitalists if they can learn how to bring together their scattered individual resources. Suffering must be the lot of those who cannot work together in any way, debarred by inherent defects and deficiencies.

Human worth has always suffered from continued neglect in the material affairs of mankind. Here, therefore, human misery and degradation has been so varied and extensive. The poor and the friends of the poor have continually appealed to the moral sense and asked people to take money without forgetting morality. But no endeavour to protect the weak from the strong by a simple appeal to the sense of justice has ever been successful. *So what we should strive for is to make wealth free to all by organising the labour of all.*

This is what is known as the principle of co-operation which has made men great in knowledge, which in human dealings is supported by our sense of justice and the lack of which, in political and economic spheres, has been the cause of world-wide misery and deep unrest.

Clashes of powers are spreading a conflagration everywhere. Unless that is checked, there is no way out of a universal cataclysm. This an organisation of the strong cannot prevent, but an organisation of the weak can. For, in material affairs, the difference between the strong and the weak has become most dangerous to-day. Of course, there are other differences, *e.g.*, between the educated and the uneducated, but education does not raise walls between man and man. On the other hand, the walls of separation that are being raised between countries and communities—should we accept them as inevitable, there can be no end to our conflicts and humiliations. Differences there were in former times, but the walls did not attain to such giddy heights. Both capital and profit were far more limited, so human sociability was not cast into such a deep shade. A profiteering tendency did not pervade and pollute—as at present—literature, art, politics, home-life and what not. There were broader fields of human communion beyond that of economic competition.

So in the social activity of to-day the poor, rather than the rich, really count. The instability and imperfections of civilisation—so long due to the helplessness of the destitute—have to be

remedied by the destitute themselves, strengthened and reinvigorated.

In Europe the co-operative principle is making headway in the commercial world. There it is easier for people to think of working together and actually possible to so work. We, Indians, especially the Hindus, are very weak on that score. But it is to be hoped that on account of the very poverty of our people co-operative organisation, which aims at satisfying material wants, may not be altogether impossible. If it fails, nothing else can save us ; and in that case the whole blame should lie on us alone, and none others.

Occasionally the view is set forth that the problem of poverty can be solved if we can once more revert to the simpler habits of bygone days. Which means, in other words, you cannot fall down lower than the lowest point. But is that salvation ?

Whatever has once served man's purpose will do for him for ever—this is not the lesson taught by history. His intellect will become extinct unless it can reveal itself through successive inventions in every age. A new age demands from him newer offerings, and those who fail to supply them are rejected. His inventive genius creates new situations and opportunities which in themselves add to the resources of former times. In the pre-agricultural age man lived on wild fruits and never felt any want. With the invention of the plough came tilling of the soil, as well as farming, farm, houses and trade-centres, laws and regulations. A long train of evils followed in its wake. But man, the inventor of the plough, must himself think out their antidote. To advise abolition of the plough, frightened by its intricacy, is as good as setting up the human head on the body the other way round. There have been examples in history of nations fixing their star on the past and, instead of making headway, trying only to conserve. Such nations stand for death in life, which is worse than death itself. It is true life is expensive, death quite cheap. But who will therefore suggest that death is thebest solution of poverty? It is not worthy of manhood to live a moribund existence in the present with the worn-out resources of the past. The needs of man are many, his demands boundless and his power of fulfilling these demands inexhaustible Luxury—Is there any such thing ? Is it luxury to replace the old castor-oil lamp with the kerosene lantern and this again with electric light ? Assuredly not. Electric lights should be abolished only when it is regarded unnecessary artificially to create light after sunset. Electric light is an improved satisfaction of the same need that made us light an earthen lamp in the evening. To use it to-day is not luxury not to use it is poverty. A cow-cart was the indication of wealth when man used to tramp about on foot, and a motor-car of to-day

is only its latest-evolved form. It would mean poverty of the man who uses a cow-cart not to use a motor-car now. Wealth of one age is poverty of another, and it is sheer cowardice to advise us to go back to poverty to make an end of poverty.

It is indeed a fact that most of the modern conveniences are secured by the rich, which means that the many are deprived while a few enjoy. It is a social anomaly resulting in disease, division and crime. The way out is not in curtailing wealth, nor forcible expropriation, nor organised charity. The way out is in generating in every man as far as possible the power to produce wealth by preaching the gospel of co-operation among men.

I cannot believe economic inequality will be ever removed by force or fluke, as inequality of power, which is inherent in man, must have some external manifestation. This economic unevenness is caused by temperamental differences : some love to hoard, others to spend. A dead level of equality, a dull monotony, is not possible in human life, nor desirable or beneficial either ; absolute equality deadens energy and demoralises intellect. Extreme inequality, on the other hand, is to be condemned, as it erects barriers that hinder social intercourse between man and man. In the dark caves of such barriers are bred evils of many forms and shapes.

People in general should have the power to throw open to the majority all the latest means to health, education and livelihood. A social arrangement that assures only bare living is not good for man : nay, more, it is insulting to his dignity ! He has a right to sufficient wealth and leisure to cultivate his humanity.

In our mainly rural and agricultural country co-operation of a sort once prevailed. Life's complexities were more or less unknown. Needs being few, one's contact with others was easy. Even then the rich naturally were comparatively few in number. But the difference is this that the rich of to-day are isolated by their selfish enjoyments, whereas in former days they bound themselves to others through unselfish charity. Owing to fall of income and rise of expenditure, the rich cannot any longer afford to be charitable. It is all the better. People must now evoke powers from within if they desire any lasting good. The villages of India—nurseries of civilisation—will live once more and revive the whole country if this path is followed and the co-operative principle is utilised to organise our means of livelihood. Co-operation is therefore indispensable for us. I fervently hope wealth will have its fullest release in this land of ours, and it will be here—by this sacred conjunction of united efforts—that the throne of the Goddess of Plenty will be firmly established.

PROBLEM OF SILAGE IN MARWAR.

S. N. LAL, HONY. SEC., MILK IMPROVEMENT ASSOCIATION, JODHPUR.

There are two methods of preserving fodder grasses and cereals.

The first consists in allowing the crop to remain exposed to the sun after cutting until it becomes too dry to "heat" or ferment. It is now known as hay if made from grasses, or straw if from cereals.

There are several disadvantages attendant on this process :

(1) The hay may be "stacked" in too damp a condition, in which case it "heats."

This "heating" causes deterioration in nutritive value, and may even result in the stack catching fire.

(2) It is very easy in this country to stack the hay too dry, which again causes loss of nutritive value.

(3) The hay, once stacked, becomes dryer and dryer, more and more powdered and tinderlike.

After three years there is a rapid loss of nutritive value in even the best hay.

(4) The stack attracts rats in enormous numbers, which cause great loss by eating the hay, and are further a source of danger to the village as they are potential plague carriers.

The second method consists in storing the hay or cereal crop after it has been cut while it is still in a "juicy" state, and controlling the resultant heating (fermentation) by the exclusion of air through pressure.

The product is now known as silage, or ensilage, and has the following advantages :—

(1) It can be made of any juicy green fodder plant excepting roots and potatoes.

(2) The process of making is practically fool-proof, the margin of possible error being very small.

(3) During the process of making the nutritive value of the herbage is increased.

(4) Silage will keep for years and years without loss of nutritive value, and can be kept in a "rat-proof" condition.

(5) It can be used as a food for all domesticated stock.

THE SILO.

This is the name given to the structure in which the herbage is stored, and in which fermentation takes place.

There are two varieties of Silo—

(1) the overground Silo : and

(2) the pit Silo.

(1) The overground "Silo" is simply a hollow tower built of wood, stone, brick, etc.

At close intervals, one along the other, are doors, capable of being opened outwards, and of withstanding great pressure. Through these doors the silage is removed, from the highest door downwards, a very easy process, as the stuff has only to be cut with spades and thrown into a cart waiting underneath.

The first disadvantage of this type of silo is the difficulty of filling, as the herbage has to be thrown in from the top. This is overcome on up-to-date farms by the use of machinery which cuts (chaffs) the herbage into short lengths, which are then "blown" by air up a big tube and over into the silo.

The second disadvantage is the difficulty of weighting the herbage so as to produce sufficient pressure, particularly on the top layers.

Sandbags, big stones and other heavy weights are used to press down the top of the contents of the silo, but even then as much as the first six feet of the silage becomes overfermented and spoilt.

(2) The pit silo is simply a round hole in the ground. It may be lined with brick, stone, cement, etc., or just left "kachcha."

Its dimensions may be anything from ten to twenty feet in diameter, and as deep as the level of the surface water permits.

Well-drained upland should, of course, be chosen as the location of these pits.

The disadvantage in this case, of course, is in the emptying of these silos. Filling is easy, the grass, etc., being just dumped in from the cart. Pressure is attained by heaping up the grass, etc., in a high pile over the mouth of the pit, and covering with rammed earth. In the first place, the pile above ground should be as high as the depth of the pit beneath it.

During fermentation, and after concentration takes place, the contents of the silo and pit shrink, and this pile diminishes in size. The top layer of the pile is found to be bad on opening, but only for a surprisingly short distance down if plenty of earth has been used, and it has been well "rammed." This covering of earth requires occasional inspection and reramming, but otherwise no other attention is required.

A Suggestion.

Possibly in Marwar, where small steep hills abound, a combination of the two types of silo might be made. A piece of earth might be cut out of the side of a hill, and then walled up (with doors) so that three sides of the silo are the earth of the hill, and the fourth the stone wall. This should combine the advant-

ages of both the "overground" and "pit" types of silo, because for filling the wagons could come up the back of the hill, and for emptying could be brought to its foot, by the side wall of the silo.

PREPARATION OF SILAGE.

There is only one possibility of error in the making of silage—the attaining of pressure too early. As a result of this, fermentation proceeds too slowly, or even ceases.

This, however, is easily overcome by filling the silo slowly.

The method found most satisfactory by the author, in India and doubtless well adapted to Marwar, is to fill from one-third (if chaff is used) to one-half (if long herbage) on the first day, wait two days, and fill up another third, or completely. Then should come another two days' interval and the silo should be filled up (there will have been some settling) and the top trodden by bullocks, filling up as settling takes place.

When level with the mouth of the pit, herbage begins to be piled up over the mouth of the pit.

A wall of rammed earth keeps pace with the height of the pile, which should be allowed to take the natural rounded form it will assume acting under the influence of gravity. This pile should be compressed (rammed or trodden by bullocks) as much as possible, and built slowly, its construction being spread over two or three days. The whole should then be covered with a thick layer of well-rammed earth, which should be rerammed as settling takes place.

With occasional inspection and repair of this covering of earth, the contents of this silo will remain good for years. The author assisted in thus making some silage in 1928, and saw it in use in 1931, in excellent condition.

As previously stated, the herbage can, be chaffed, or put in its natural state. Chaffing is the better as, fermentation occurs more quickly, pressure is more satisfactorily applied and shrinkage and settling are less.

The extra labour involved, and the capital cost of the chaffing machine, need, however, be no deterrent—silage made of long herbage is just as good in the long run as that made from chaff.

ONE OTHER POINT.

The contents of the silo must be put in wet. In dry countries it is generally found best to sprinkle the herbage with water as it is put in. Rain during the process of filling the silo is not detrimental ; as previously stated, the process is fool-proof,

provided the herbage is green, or semi-green, when filled, and provided filling does not take place too rapidly.

Time to cut grass for silage: This is at, or just after, flowering, when the nutritive property of the grass is at its highest.

Time to cut cereals for silage: As the grain is formed in the ear, just before the plant begins to turn yellow and ripen.

FEEDING SILAGE.

It should be fed first of all in small quantities, with the usual rations, until animals become accustomed to it.

Later, they eat it with avidity, even preferring it to green meadow grass.

It should be regarded as taking the place of hay in the daily ration, although alone it is an adequate diet from the subsistence point of view. In other words, its use for working horses and bullocks should be supplemented with a little corn or other concentrated food.

MANAGEMENT OF BULLS.

I. MURARI, B.Sc. (OXON.), F.L.S., HOSUR.

It is a well-known fact that the cow in India is considered to be a sacred animal, but nowhere have I seen her being so badly treated as here. Her sanctity is mainly due to her usefulness to man, and yet, as far as the average ryot is concerned, the management of cattle is far from sound. He feeds the cow when there is plenty, and starves her when there is no fodder available. The work animals are treated better, but even here there is much room for improvement. The ryot in his usual routine does neither provide nor conserve fodder for his cattle as does the farmer in Western countries. It is needless for me to lay stress on the most important point that management and breeding depend on one another, so much so that highly-bred cattle from such an experimental station as Hosur are apt to suffer severe set-backs and probably fail to increase the standard of stock in the country at a rate one would desire. IT HAS BEEN BROUGHT TO NOTICE THAT SOME OF OUR BULLS SENT FROM HERE DO NOT SERVE WELL. ON INVESTIGATION, IT IS GENERALLY FOUND THAT THERE IS SOME FLAW IN THE MANAGEMENT. In passing, it may be mentioned that nearly all bulls meant for breeding are generally tested before despatch.

The usual causes for complaint are as follows :—

(1) The cows are brought to the bull after the heat period has passed.

(2) Lack of patience on the part of the owner of the bull, who wishes the service to be done straightaway.

(3) Some cows do not stand even if they are in heat : to overcome this difficulty, they may be put between two poles crosswise (x) so as to keep her in position.

(4) The bull itself is badly managed and spoilt by giving far too many cows to cover.

In the management of bulls, food, housing, and exercise are the main items. As it would be impossible for me to expect the poor ryot to build new cattle-sheds on modern lines, I would suggest that the bull is given a well-dried, clean litter to lie on, sufficient room to move about, and plenty of light in the place where he is tethered. If the roof is fairly high, so much the better.

Feeding must provide sufficient energy for maintenance and production. The maintenance ration is given to keep the body in normal working order, and the production ration for work or milk secretion. In the case of breeding bulls, however, I should consider him as a working animal. The ration must contain sufficient bulk so as to satisfy the animal; fodder, like hay and cholam straw, ragi straw, or lablab, may be useful, but it must be supplemented by sufficient succulent feed, like grass, or lucerne, or silage. In addition to bulk, palatability must be taken into account. It will be found that animals would not eat mouldy or evil-smelling fodder, nor would they eat too fibrous foods unless forced by circumstances. Having taken maintenance into consideration, extra food should be given for production. It must, however, be remembered that in the stomach there is no line of demarcation between maintenance and production rations. There is no doubt that, when there is more than sufficient ration for maintenance, the excess would be used up for production.

One of the best methods of feeding cattle is to give the production ration first, and maintenance or bulky fodder later. In the absence of digestibility figures for Indian fodder, I suggest the following rations, but they may have to be modified as we get to know more about them :—

MAINTENANCE RATION.

1. 14-18 lb. hay.
   7-10 lb. straw or grazing.
2. 25-40 lb. silage.
   1-14 lb. hay.
   7 lb. straw.
3. 30-50 lb. green foods, such as lucerne, lablab, and some grass straw (adlib).

PRODUCTION RATION.

2-3 lb. groundnut cake.
1-1½ lb. rice bran.
1-2 lb. wheat bran.
1-2 lb. horse gram.
½ to 1 lb. chenna bhusa.

For getting the animal into better condition rice bran may be substituted by linseed cake.

Salt lick, water for drinking.

Management is very important, for it would not be possible to feed animals by rule-of-thumb methods. It is essential for the owners to know their animals. Very often the animal has his likes and dislikes, and regularity in feeding is essential. I think the best method of feeding is to divide the ration into three parts, and feeding one part at 6 a.m., the second part at midday, and the third at 6 p.m. The food should be adjusted in such a way that the animal clears all that is given to him. It is essential that the animal is washed at least once a week and groomed twice a day. To give his coat a good shine, some cocoanut oil may be rubbed, and some lamp oil may be used for shining the horns after trimming.

Exercise is very important for keeping the bull in perfect health. I think it is best to give the breeding bull light exercise for a few hours every day. He may be allowed to draw a cart or, in the absence of carts, he should be made to run for about five minutes and given a good walk. Soon after exercise he should be thoroughly groomed.

When the bull is young, he should be given about 30 to 40 cows, and later the number may be increased to 60, a year. It must be remembered that too much feeding makes the animal sterile, and feeding, including exercise, should be regulated in such a way that the bull is in condition and serviceable. After every service the sheath should be cleaned with any antiseptic lotion like Lysol, and it would always be advisable to make sure that the cows for service are healthy. In order to find out whether or not the bull is a good getter of calves, a register should be maintained and the progeny noted.

FERTILIZERS FOR GARDENS.*

It is generally admitted that stable or barnyard manure is the best all-round fertilizer for the garden. It contains nitrogen, phosphorus, and potash, the three most important elements necessary to maintain the soil in a state of fertility. Manure usually gives satisfactory results, even though no other fertilizers are used. In addition to the plant food contained, it supplies humus (decayed organic matter) which improves the physical properties of the land and by its decay makes plant foods available that would otherwise be locked up in the soil. Experience has shown that, in order to get the best results from the use of "commercial" fertilizers, it is necessary for the soil to be well stocked with humus, and stable or barnyard manure is probably the best form in which this can be added to the soil. Barnyard manure may be applied in the spring or fall. If the manure is thoroughly decayed, and is in a finely pulverized condition, it is a good plan to

* Brooklyn Botanic Garden Leaflet, S X. VIII.

first dig the ground, leaving the surface rough, and then spread the manure, afterwards raking thoroughly so as to mix it with the surface soil. The quantity to use depends upon the amount of humus already present in the soil, and whether it is planned to use commercial fertilizers in addition. If the soil is deficient in humus, a heavy application is desirable to improve its physical condition; on the other hand, if humus is already present in large quantities, it will be economical to reduce the amount of stable manure and supply the chemical elements necessary by using more concentrated fertilizers.

It often happens that it is not convenient in city gardens to maintain the supply of humus by the use of barnyard or stable manure. In these circumstances the growing of a cover crop to provide green manure is a convenient method of supplying humus. Another source of supply open to city dwellers is the collection of the leaves when they drop from the street trees, provided that they have not been fouled by passing traffic. These should be piled in an out-of-the-way corner of the garden and mixed with the soil when they are one or two years old. Decay may be hastened by forking over the leaves two or three times during the summer. Garden refuse of all kinds, such as lawn clippings, the leaves and stems of vegetables and flowers may be treated in the same way. This latter method sometimes has the disadvantage of returning to the soil the spores of disease organisms that may be present, thus providing a source of infection for future crops. Another means of adding humus is to obtain one of the numerous brands of humus or peat moss obtainable from most seed houses or nurseries.

Chicken manure, which is sometimes available, is one of the most concentrated of the organic fertilizers. It can be used to good advantage to supplement a dressing of barnyard manure, at the rate of 20 pounds to 400 square feet. As the plant food it contains is quickly available, it should be applied in the spring as a surface dressing, thoroughly mixing it with the soil. If this fertilizer is available in a sufficient quantity to warrant its being used as a base for the complete fertilizer, it should be used at the rate of 40-50 pounds to 400 square feet, supplemented by ashes. The chicken manure must not be mixed with the other ingredients before application, or loss of nitrogen will take place. Chicken manure, previous to use, should always be stored under cover to prevent leaching. A good method which facilitates future handling is to place it in barrels or boxes in layers with an equal amount of dry soil.

Sheep manure, while not so concentrated as the preceding, can be used in much the same way by increasing the quantity about 50%.

Bone-meal is an important source of phosphoric acid; it also contains some nitrogen. The coarser grades act rather slowly, and the food materials contained are not immediately available. Acid phosphate prepared from phosphatic rock is another important fertilizer supplying phosphorus. It is used at the rate of 8-12 pounds to 400 square feet.

Wood ashes contain potash and lime and small amounts of phosphoric acid. It is a fertilizer especially valuable on clayey soils as it improves their physical condition. It is considered to be a valuable fertilizer for all roots, such as beets and carrots. Use 20 to 40 pounds to 400 square feet.

Sulphate of potash and muriate of potash contain potash in a more concentrated form than the preceding, and are used at the rate of about 3-5 pounds to 400 square feet.

Nitrate of soda is a very quick-acting fertilizer, and is useful for stimulating the growth of plants in early spring when the nitrogen content of the soils is usually low. It is especially valuable for crops that are grown for their leaves, such as cabbage, Swiss chard, spinach, and lettuce. Use 1½ to 2 pounds to 400 square feet. As nitrate of soda is readilly soluble in water, it should not be applied much before the crop can use it. The writer prefers to use this fertilizer as a top dressing after the plants have started their growth, applying it at the rate of half an ounce to a square yard at intervals of about three weeks. All lumps must be crushed before using, and care must be taken not to allow any to lodge on the leaves of the crop. Great caution must be exercised in the use of this fertilizer, especially in connection with crops that are grown for their roots or fruits, such as beets, carrots, peas, beans, and tomatoes, as it may result in the production of leaves at the expense of the part desired for use. Sulphate of ammonia and dried blood are other important sources of nitrogen.

Acid phosphate, bone-meal, nitrate of soda, and wood ashes are not what are known as "complete" fertilizers; that is, they do not provide nitrogen, phosphorus, and potash. It is customary to use them in combination with other fertilizers, or to supplement a complete organic fertilizer which may have a deficiency of one or more of the three elements most necessary as plant foods. It will be noticed, for instance, that wood ashes is part of the formula, with chicken manure as a base. Bone-meal could be used to take the place of the acid phosphate in this formula.

Lime is an indirect fertilizer in that it helps to put the soil in good physical condition, provides the slight alkalinity desirable for most vegetable crops, and assists in making inert plant foods available. It is used in the form of ground limestone, proof air-

slaked lime, at the rate of 20 pounds to 400 square feot.

It should be borne in mind that lime, or any fertilizer containing lime, such as wood ashes, must not be applied so as to come in contact with any organic manure, or it will result in loss of nitrogen.

All concentrated fertilizers can be best applied by first digging or ploughing the ground, leaving the surface rough, then scattering the fertilizer, afterwards raking to mix with the soil. Bulky manures, such as undecayed barnyard or stable manures, leaves, and cover crops should be dug in as deeply as possible.

WHAT MILK DID FOR 41 BOYS

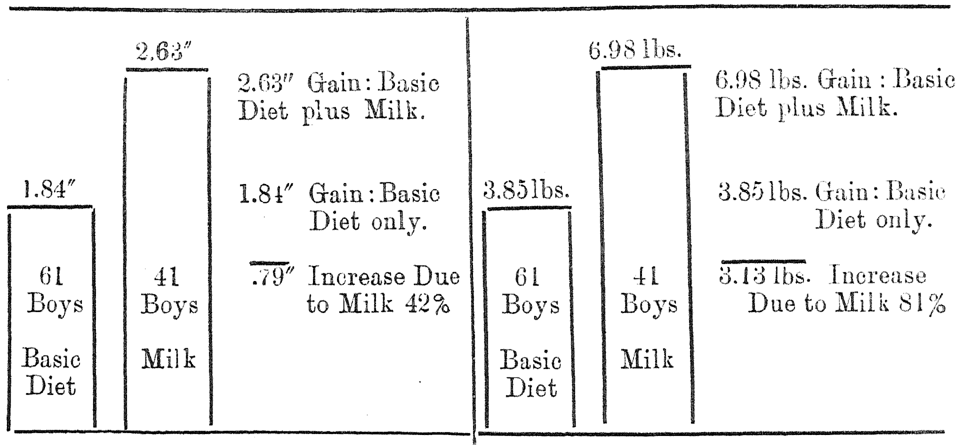
The Medical Research Council of London, England, recently conducted a very important and far-reaching experiment with children to determine the food value of various articles of diet, among which was milk. A total of two hundred and twenty boys were studied.

Hundreds of experiments have been conducted on small animals to prove the relative values of various foods, but this is one of the most far-reaching experiments ever conducted on a large scale *with children.*

Sixty-one boys were given a basic diet. This basic diet satisfied the appetite of these growing boys, and apparently was all that was needed. During the first year these boys increased in height 1.84 inches and gained an average of 3.85 pounds.

Another group of boys, forty-one in number and as nearly like the group of boys fed on the basic diet as possible, were fed a pint of milk a day in addition to the basic diet. As a result, their gain in height was 2.63 inches and their gain in weight 6.98 pounds. In other words, their increased gain in height, because of the milk, was 42 %, and their increased gain in weight, because of the milk, was 81 % over the basic gain.

The basic diet varied from day to day, and consisted of selections from the following: Potatoes, Bread, Beef, Pork, Herring, Kipper, Sausage, Dumplings, Cabbage, Beets, Beans, Peas, Porridge, "Hoosh," Lettuce, Molasses, Sugar, Cheese, Cocoa (containing a total of two to four ozs. of milk daily), Margarine, Jam, Raisin and Suet Pudding, Rice Pudding and Cake.



Average Annual Increase in Height. | Average Annual Increase in Weight.

It is to be noted that no preference was shown in selecting the groups; they were as evenly balanced as it was possible to make them. The entire experiment was planned and conducted under the supervision of the Medical Research Council.

The differences in gains were the result of the food, and nothing else, inasmuch as the housing conditions were the same for all the children, their activities were the same, and the same factors prevailed in all cases, except with respect to food.

NOTHING CAN SURPASS PURE MILK FOR THE GROWING CHILD.

Agricultural Institute Dairy, Allahabad.—Milk Campaign.

FOOD VALUES

In the evaluation of any particular food it should be considered from six points of view—

1. Taste.
2. Digestibility.
3. Caloric Contents.
4. Balance—Protein, fat, carbohydrate content.
5. Vitamins—A, B, C, and D.
6. Accessory food factors—Salts and roughage.

On 3 and 4 the following table gives some interesting information for some of the common Indian foods.

Table of Food Values.

Article	Grammes per Chhatak			Calories per Chhatak	Price		
	Protein	Carbo-hyd	Fat		Chhatak	Seer	1,000 Cals.
Ata ..	7	40	1·5	204	2½ pies	0·3·9	0· 1· 0
Rice ..	4	47	·5	208	3 ,,	0·4·0	0· 1· 3
Jawar ..	4·6	41	1·2	182	1½ ,,	0·2·0	0· 0·8¼
Bajra ..	4·3	43	1·	196	2 ,,	0·2·9	0· 0·10
Suji ..	8·4	28·4	1·4	160	3½ ,,	0·4·9	0· 1·10
Makai Ata ..	5·8	40	1·2	192			
Arhar Dal ..	13	32·4	2	200	2 ,,	0·2·9	0· 0·10
Matar Dal ..	13·2	32·2	1·2	192	1¼ ,,	0·1·9	0· 0· 7
Meat ..	12	..	4	80	6 ,,	0·8·0	0· 6· 3
Milk ..	2	4	2	40	3 ,,	0·4·0	0· 6· 3
Ghi ..	..	..	4·8	432	1 an. 9 ,,	1·12·0	0· 4· 0
Mustard Oil ..	..		5·8	522	7½ ,,	0·10·0	0· 1· 3
Potato ..	2	12	..	60	3 ,,	0·4·0	0· 4· 2
Green Vegetables ..	·5	2	..	10	1½ ,,	0·2·0	0·12· 6
Moola ..	·4	1·1	..	6	1½ ,,	0·2·0	0· 4· 9
Kismis ..	1.6	6·8	4·8	76	1 anna	1·0·0	0·13· 2
Mango (Bombay) ..	·036	5·2	·22	22	3 annas	0·4·0	0·11· 4
Banana (Champa) ..	1	9	..	40	4 ,,	0·5·5	0· 8· 4

Every food has its good qualities and deficiences. A good all-round dietary is the best in the long run.

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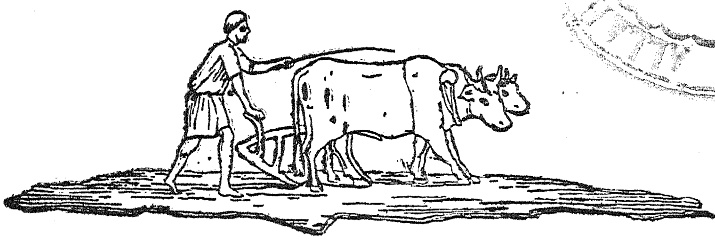
MENTION "THE ALLAHABAD FARMER" WHEN WRITING TO OUR ADVERTISERS.



EDITORIAL

It's the Brain that counts.

Dr. Charles Mayo, that noted Scientist, Physician, and Surgeon, says "You can get along with a wooden leg, but you can't get along with a wooden head. The physical value of a man is not so much. Man, as analyzed in our laboratories, is worth about ninety-eight cents, seven bars of soap, lime enough to whitewash a chicken coop, phosphorus enough to cover the heads of a thousand matches, is not so much you see. It is the brain that counts; but, in order that your brain may be kept clear, you must keep your body fit and well. Keep yourselves free from entangling habits. Remember, it's the brain that counts."

—INTERNATIONAL STUDENT.

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Sex Education in the Home.

During the last 10 to 15 years society has been learning that many tragedies in marriage and much suffering among innocent women and children have been caused by sex diseases, to be met with in all walks of life.

A wholesome curiosity about birth and sex exists in all normal children. It is there by nature. The general lack of sex knowledge, and a perverted sense of the same, has become evident to the writer through discussions with students and visitors while talking on the subject of cattle-breeding. The main task lies with the mother in the home, from the time the child exhibits a normal curiosity. Life is a mystery, and the unfolding of life is an ever-present example of the evolution of life going on round about us. Sex out of control, through lack of knowledge and ignorance, is one of the greatest curses to mankind. Proper sex knowledge and control will result in normal development and a well-regulated life. Too much thought cannot be given to this subject by parents and social workers.

The Training of the Young Farmer.

The training of our grandfathers presented no problem. They were trained in the schools of practical farm experience and hard knocks.

To-day conditions are different! Modern methods of science and machinery have revolutionized the humdrum existence. Economic conditions have changed, and are changing daily. *The day is past when farm experience alone is sufficient in itself for the modern farmer, and is now here when practical young farmers should have a period of formal training in an educational institution.*

"Practice with Science" should be the basic principle for the young farmer.

To-day, in India, we find the majority of young men in the agricultural colleges without previous agricultural experience. This is a handicap to them, and a great burden on the educating institution. A good general education and practical farm experience will be found most helpful as a preliminary to agricultural education.

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Social Hygiene.

A selected list of books and pamphlets approved by the Social Hygiene Committee of The National Christian Council, December, 1930, may be obtained from the Association Press, 5, Russell Street, Calcutta. These books and pamphlets cover the needs of children, adolescents, and adults.

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Cornell School for Missionaries on Furlough.

Cornell University, New York, U. S. A., offers a four-week course to missionaries on furlough. The course covers the Sociology of Rural Life, Agriculture, Rural Education, Nutrition and Health. The course was held from January 19 to February 14, 1931. It is a course of real value to rural workers.

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Harvesting Rusted Wheat.

Experiments conducted at the Dominion Rust Research Laboratory, Canada, by F. J. Greaney have indicated that cutting rusted wheat before it is fully mature significantly reduces the yield. There is nothing to recommend the practice of cutting wheat early to avoid rust damage. For best results, heavily-rusted wheat should be harvested when the majority of the kernels are in the hard dough stage, that is, two or three days before it is fully mature.

—Scientific Agriculture, Vol. XI, No. 8.

The Christian Mission in Rural India.

It is well in these days that the Christian Mission in Rural India be thoroughly understood by all parties. There has been a great deal in the press of late regarding Mr. Gandhi's views of missionary enterprise in India. Young India has printed a number of protesting letters. We do not intend to go into the matter in any detail. We simply wish to draw the attention of our readers to the report and recommendation on the subject of "The Christian Mission in Rural India," by Dr. Kenyon L. Butterfield, available at The National Christian Council, Nagpur. Dr. Butterfield is an outstanding authority on the problems of rural life, and after a wide itinerary in India, and many searching enquiries, has written a report that everyone interested in rural problems ought to read and study.

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On the Use of Manure as Fuel.

Dr. P. E. Lander, Agricultural College, Lyallpur, in his bulletin "On the Use of Manure as Fuel," says that the practice of converting dung into dung-cakes for fuel purposes results in an enormous manurial loss to the country. He points out that the chief cause of burning manure is the lack of a readily available substitute for dung-cakes which can be used for fuel purposes. His experiments with maize show the total value of the increased yield to be Rs. 8-0-0 per ton of farmyard manure. Based on the chemical analysis of farmyard manure, and taking the manurial ingredients at commercial fertilizer prices, he shows that a ton of farmyard manure is worth Rs. 15-6-0. He also shows that the loss of manurial ingredients in one ton of dung-cakes amounts to Rs. 23-12-0, based on chemical analysis and price of chemical fertilizers. These figures do not allow anything for the value of the humus supplied to the soil through farmyard manure. Two main points raised in this bulletin that demand the attention of every agriculturist are—

(1) the need of devising some readily available substitute for dung-cakes which can be used for fuel; and

(2) The adoption of methods of more efficiently conserving the manurial value of farmyard manure.

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Excessive Rail-road Transportation Charges.

We have had occasion to sell a number of crossbred merino rams to a native state for the modest sum of Rs. 8-0-0 per head. The shipping charges to destination amounted to Rs. 7-14-0 per head. (They were shipped in the brake-van on passenger trains.) This is the amusing, unintelligible, and rather lamentable,

feature of the affair. The dog rate is 5 annas per fifty miles, while that of sheep is 10 annas per fifty miles. Such rates are a discouragement to sellers, buyers, and shippers of live stock, and certainly acts as a limiting factor in the exchange of stock from one part of the country to the other. It is hoped that the railway authorities will take a more reasonable attitude when fixing their rates in future.

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Silage.

Silage is the best and cheapest form in which to store succulent feed. Many forage crops can be made into silage.

Good quality in the silage depends upon cutting the crop at the right stage, fine cutting, thorough exclusion of air, and plenty of moisture in the cut material. When rightly put up and carefully fed, there should be no loss from spoiling, except on the surface.

Silage is suited for feeding to all live stock. Dairy cows need it perhaps more than other classes of animals because the succulence it supplies is helpful in the production of large quantites of milk.

—U. S. D. A. Farm Bulletin 578.

* * * * *

Food.

"Nutrition is the most pressing of all present-day problems in India; and, although for many millions of Indian people this problem is one of obtaining enough to eat, yet it is well that the rising generation, amongst the more educated classes, should learn something of the simple truths of nutrition, and how to make the best use of such food-stuffs as are obtainable. Thus they may benefit themselves and be in a position to instruct others."

The foregoing is the opening paragraph of the foreword to the little booklet, "Food," by Lt.-Col. Robert McCarrison, I. M. S., published by Macmillan & Co., Ltd., Bombay. The contents of the book will well repay careful reading.

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Indian Dairy Diploma.

Admission to the Indian Dairy Diploma Course at the Allahabad Agricultural Institute will be in July this year, instead of in October as formerly. The Imperial Dairy Expert has given his consent to this change, which is made in order to save students the necessity of waiting several months after the beginning of the educational year, and in order to make admission to this course coincide with that of the Intermediate Course in Agriculture.

World's Unemployed.

The International Labour Bureau, Geneva, Switzerland, recently announced that the total number of unemployed in the world is approximately 20,000,000, with the European total at 11,000,000.

It is admitted that there is something wrong with our present economic system when wheat is being burnt as fuel in one part of the world and stomachs are going hungry in the same part of the world and elsewhere. The man on the street is helpless. But what can be done?

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Anaphylaxis (Food Poisoning).

"What is one man's food is another man's poison" has now been proven as a scientific fact. To a much larger extent than realized, many persons chronically unwell, and subject to headaches, digestive, bronchial, and skin disorders, are thus ailing because some certain food quite good enough in itself is nevertheless a poison to them. It is believed that all foods may provoke anaphylaxis, but the individual must be sensitive to a certain article of food or food group. The food to which he is sensitive, when eaten by him, will provoke the anaphylactic state.

Three foods are at present considered of major importance in provoking a toxic reaction: milk especially in infants, eggs more particularly in children from four to fifteen years, flour in adult life.

The toxic reaction may be so serious, particularly in infants, that death results in a few hours after becoming sensitive to milk protein. This certainly is the termination if a further feeding of milk be given to the sensitized little patient. The re-education to milk tolerance can be accomplished only by a very cautious drop method of feeding.

There is a less serious, but more prevalent, type in which the anaphylaxis is accompained by abdominal pain, vomiting diarrhoea, eczema or urticaria. Respiratory symptoms of an asthmatic nature are frequent. There may be migraine, and even epileptic storms.

There is a chronic form of anaphylaxis in which the patient is never quite well, but has acute aggravations. These exacerbations may be dyspeptic, or muco-membranous colitis. There is usually persistent headache, chronic eczema, and chronic asthma. When this association of symptoms is present, it points strongly to food anaphylaxis as the cause.

The cure for this condition consists mainly in determining which food is the provocative factor, and eliminating this food entirely from the patient's diet.

As an aid to discovering the harmful food, two tests have been developed. They are known as the skin reaction test, and the

intradermal test. In both of these tests the suspected food is used in the effort to produce a characteristic reaction.

Since all persons are perhaps sensitive to some particular food, a careful check-up to find what is food and what is poison would be most helpful as a prophylactic, as well as a curative, measure.

—CONTRIBUTED.

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Water for Cows.

A man who has had experience only with cattle raised for beef will be astonished if he undertakes to carry the water for a day to a high-producing dairy cow. It might teach him a lesson, however, that would be valuable if he ever decided to keep dairy stock. The milking cow requires a large amount of water indeed because the milk itself requires a considerable amount, and, further, a high milking cow is necessarily a heavy-fed animal, and needs a large amount of water to carry on digestion.

According to Dr. C. H. Eckles, a Jersey milking 27 lbs. daily on a ration of silage, alfalfa, and grain used 77 lbs. of water daily. Another cow milking 31 lbs. drank from 215 to 320 lbs. daily during the week records were kept. It may be said in general that a cow will consume about 20 lbs. of water daily when dry, and when in milk at least three times the volume of her milk production. These figures hold good when silage is part of the ration. If dry hay alone is the roughage, more water will be used. A dry cow used 15 lbs. of water daily compared to 75 when milking.

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Dairying—America's Largest Industry.

In California, U. S. A., there are more than thirty thousand farm families that depend wholly or in part on the dairy cow for their income—for the means wherewith to provide that which is needed for self-respecting American families. Than the dairy business there are none that are more nearly primary, and none come to mind that is any safer, one year with another. It is not a get-rich quick scheme, but a good dependable occupation.

Recently the dairy business has attained to a new dignity—that of being the nation's largest industry. But at that it can never be swallowed up by so-called "big business." It will ever remain a human vocation, one requiring the personal attention of the owner to do its best.

—PACIFIC RURAL PRESS.

Let every day be house-cleaning day—keeping down the accumulation of things that we ought to do!

"Celebrating the Centennial of the Reaper."

It is now 100 years since Cyrus Hall McCormick invented the first reaper. The world may well honour the inventor of the machine that ushered in a new era of agriculture, of progress, and of freedom from humanity's age-long enslavement to the soil.

The story of the inventive genius of Cyrus Hall McCormick is intensely interesting from both the philosophical and agricultural viewpoints. It is a story of man's conquest over nature.

A fifteen-page story of human endeavour, which our limited space does not permit us to reproduce, may be secured by writing to E. A. Pritchard, P. O. Box 538, Bombay.

* * * * *

A New and Higher Interest in Farming.

A fair knowledge of plants is essential to the grower not only from the standpoint of enabling him to care better for his crop and to utilize improved methods and varieties, but also because of the fact that knowledge of plants and their life functions tends to arouse a new and higher interest in farming. Such knowledge should enable the grower to see and appreciate the value of improved varieties, cultural methods, and systems of production.

This is a crying need of agriculture in India to-day. A need for a new and higher interest in farming.

* * * * *

Flower, Vegetable, & Fruit Gardening.

We wish to announce that, commencing with the October number of "THE ALLAHABAD FARMER," seasonal articles will appear in our columns dealing with the practical aspects of Flower, Vegetable, and Fruit Gardening culture. These articles will be purely of fundamental practical value. Highly technical phases will not be dealt with. The purpose will be to give the readers such tips as will enable him or her to take up the culture of Flowers, Vegetables, and Fruits, and increase their economic utility.

In some cases, our articles will not meet every need, and in this connection we wish to encourage our readers to give us the benefit of their experience and to write to us about any difficulties,

Allahabad Agricultural Institute

PURPOSE

The Agricultural Institute was founded in 1910 by the American Presbyterian Mission. By giving men both practical and theoretical training in modern methods of scientific agriculture and dairying as well as a thorough general knowledge of the sciences underlying these, it hopes to help India fight its problem of poverty.

LOCATION

The farm and grounds of the Institute are across the Jumna River from Allahabad proper, about three miles from the Allahabad Station (E. I. R.) and two miles from the Naini Station (E.I.R.) Besides being easily accessible, it is very beautifully located on the banks of the Jumna River.

STAFF

The staff consists of twelve men, Indians and Americans, trained in agriculture, dairying, engineering and sciences.